CHAPTER II.

PHYSIOGRAPHY.

§ 1. General Description of Australia.

1. **Geographical Position.**—(i) *General.* The Australian Commonwealth, which includes the island continent of Australia proper and the island of Tasmania, is situated in the Southern Hemisphere, and comprises in all an area of about 2,974,581 square miles, the mainland alone containing about 2,948,366 square miles. Bounded on the west and east by the Indian and Pacific Oceans respectively, it lies between longitudes 113° 9′ E. and 153° 39′ E., while its northern and southern limits are the parallels of latitude 10° 41′ S. and 39° 8′ S., or, including Tasmania, 43° 39′ S. On its north are the Timor and Arafura Seas and Torres Strait—on its south the Southern Ocean and Bass Strait. The extreme points are "Steep Point" on the west, "Cape Byron" on the east, "Cape York" on the north, "Wilson's Promontory" on the south, or, if Tasmania be included, "South-East Cape."

(ii) *Tropical and Temperate Regions.* Of the total area of Australia nearly 40 per cent. lies within the tropics. Assuming, as is usual, that the latitude of the Tropic of Capricorn is 23° 30′ S. (its mean value for 1936 was 23° 26′ 51.17″), the areas within the tropical and temperate zones are approximately as follows :—

AUSTRALIA—AREAS OF TROPICAL AND TEMPERATE REGIONS.

(STATES AND TERRITORY PARTIALLY WITHIN TROPICS.)

Area.	Queensland.	Western Australia.	Northern Territory.	Total.
	Sq. Miles.	Sq. Miles.	Sq. Miles.	Sq. Miles.
Within Tropical Zone	359,000	364,000	426,320	1,149,320
Within Temperate Zone	311,500	611,920	97,300	1,020,720
Ratio of Tropical part to whole State ..	0.535	0.373	0.814	0.530
Ratio of Temperate part to whole State	0.465	0.627	0.186	0.470

Thus the tropical part is roughly about one-half (0.530) of the three territories mentioned above, or about five-thirteenths of the whole of Australia (0.386).

2. **Area of Australia compared with Areas of other Countries.**—It is not always realized that the area of Australia is almost as great as that of the United States of America, four-fifths of that of Canada, more than one-fifth of the area of the British Empire, nearly three-fourths of the whole area of Europe, and about 25 times as large

as Great Britain and Ireland. This great area, coupled with a limited population, renders the solution of the problem of Australian development a particularly difficult one. The areas of Australia and of certain other countries are given in the following table :—

AREA OF AUSTRALIA AND OF OTHER COUNTRIES.

Country.	Area.	Country.	Area.
Continental Divisions—	Sq. miles.	AFRICA—*continued.*	Sq. miles.
Europe	4,412,000	Union of South Africa	472,000
Asia	16,020,000	Egypt	386,000
Africa	11,562,000	Tanganyika Territory	374,000
North and Central America and West Indies	8,649,000	Nigeria and Protectorate	373,000
South America	7,010,000	Abyssinia	347,000
Australasia and Polynesia	3,462,000	Tripolitania	347,000
Total, exclusive of Arctic and Antarctic Conts.	51,115,000	South-West Africa	322,000
Europe—		Portuguese East Africa	298,000
Soviet Union (Russia)	2,316,000	Northern Rhodesia	288,000
France	213,000	Cyrenaica	285,000
Spain (inc. possessions)	194,000	Bechuanaland Protectorate	275,000
Germany	181,000	Madagascar	238,000
Sweden	173,000	Kenya Colony and Protectorate	225,000
Poland	150,000	Other	1,444,000
Finland	150,000	Total	11,562,000
Norway	125,000	**North and Central America—**	
Italy	120,000	Canada	3,684,000
Rumania	114,000	United States of America	3,027,000
Yugoslavia	96,000	Mexico	760,000
Great Britain and Northern Ireland	95,000	Alaska	587,000
Other	485,000	Newfoundland and Labrador	163,000
Total	4,412,000	Nicaragua	49,000
Asia—		Other	379,000
Soviet Union (Russia)	5,860,000	Total	8,649,000
China and Dependencies	4,287,000	**South America—**	
British India and Administered Territories	1,096,000	Brazil	3,292,000
Arabia and Autonomous States	1,004,000	Argentine Republic	1,078,000
Feudatory Indian States	712,000	Bolivia	515,000
Iran	628,000	Peru	482,000
Dutch East Indies	574,000	Colombia (exc. of Panama)	449,000
Turkey	285,000	Venezuela	352,000
Japan and Dependencies	262,000	Chile	286,000
Afghanistan	251,000	Ecuador	119,000
Siam	200,000	Other	437,000
Other	861,000	Total	7,010,000
Total	16,020,000	**Australasia and Polynesia—**	
Africa—		Commonwealth of Australia	2,974,581
French West Africa	1,790,000	Dutch New Guinea	161,000
Anglo-Egyptian Sudan	973,000	New Zealand and Dependencies	104,015
French Equatorial Africa	871,000	Territory of New Guinea	93,000
Belgian Congo	921,000	Papua	90,540
Algeria	848,000	Other	38,474
Angola	485,000	Total	3,461,610
		British Empire	13,355,426

The figures quoted in the table have been extracted from the Statistical Year Book of the League of Nations or the Statesman's Year Book.

3. **Areas of Political Subdivisions.**—As already stated, Australia consists of six States and the Northern and Federal Capital Territories. The areas of these, and their proportions of the total of Australia, are shown in the following table :—

AUSTRALIA—AREA OF STATES AND TERRITORIES.

State or Territory.	Area.	Percentage on Total.
	Sq. miles.	%
New South Wales	309,432	10.40
Victoria	87,884	2.96
Queensland	670,500	22.54
South Australia	380,070	12.78
Western Australia	975,920	32.81
Tasmania	26,215	0.88
Northern Territory	523,620	17.60
Federal Capital Territory	940	0.03
Total	2,974,581	100.00

4. **Coastal Configuration.**—(i) *General.* There are no striking features in the configuration of the coast ; the most remarkable indentations are the Gulf of Carpentaria on the north, and the Great Australian Bight on the south. The Cape York Peninsula on the extreme north is the only other remarkable feature in the outline. In Year Book No. 1, an enumeration of the features of the coast-line of Australia was given (*see* pp. 60 to 68).

(ii) *Coast-line.* The lengths of coast-line, exclusive of minor indentations, of each State and of the whole continent, and the area per mile of coast-line, are shown in the following table :—

AUSTRALIA—COAST-LINE AND AREA PER MILE THEREOF.

State.	Coast-line.	Area per Mile of Coast-line.	State.	Coast-line.	Area per Mile of Coast-line.
	Miles.	Sq. miles.		Miles.	Sq. miles.
New South Wales(*a*)	700	443	South Australia ..	1,540	247
Victoria	680	129	Western Australia	4,350	224
Queensland ..	3,000	223	Continent (*b*) ..	11,310	261
Northern Territory	1,040	503	Tasmania ..	900	29

(*a*) Including Federal Capital Territory. (*b*) Area 2,948,366 square miles.

For the entire Commonwealth of Australia this gives a coast-line of 12,210 miles and an average of 244 square miles for one mile of coast-line. According to Strelbitski, Europe has only 75 square miles of area to each mile of coast-line, and, according to recent figures, England and Wales have only one-third of this, viz., 25 square miles.

(iii) *Historical Significance of Coastal Names.* It is interesting to trace the voyages of some of the early navigators by the names bestowed by them on various coastal features—thus Dutch names are found on various points of the Western Australian coast, in Nuyts' Archipelago, in the Northern Territory, and in the Gulf of Carpentaria ; Captain Cook can be followed along the coasts of New South Wales and Queensland ; Flinders' track is easily recognized from Sydney southwards, as far as Cape Catastrophe,

by the numerous Lincolnshire names bestowed by him; and the French navigators of the end of the eighteenth and the beginning of the nineteenth century have left their names all along the Western Australian, South Australian and Tasmanian coasts.

5. **Geographical Features of Australia.**—In each of the earlier issues of this Year Book fairly complete information has been given concerning some special geographical element. The nature of this information and its position in the various Year Books can be readily ascertained on reference to the special index following the index to maps and graphs at the end of this work.

6. **Fauna, Flora, Geology and Seismology of Australia.**—Special articles dealing with these features have appeared in previous Year Books, but limits of space naturally preclude their repetition in each volume. As pointed out in 5 *supra*, however, the nature and position of these articles can be readily ascertained from the special index. A reference to Barisal Guns will be found in Vol. IX., p. 56.

§ 2. Climate and Meteorology of Australia.*

1. **Introductory.**—In Year Book No. 3, pp. 79, 80, some account was given of the history of Australian meteorology, including reference to the development of magnetic observations and the equipment for the determination of various climatological records. In Year Book No. 4, pp. 84 and 87, will be found a short sketch of the creation and organization of the Commonwealth Bureau of Meteorology, and a résumé of the subjects dealt with at the Meteorological Conference in 1907.

2. **Meteorological Publications.**—Reference to publications issued by the Central Meteorological Bureau will be found in Official Year Book No. 22, pp. 40, 41. The following publications have since been issued:—Volume of "Results of Rainfall Observations made in Western Australia," for all years of record to 1927; Map of Normal Meteorological Conditions in Australia affecting Aviation; a Paper "A Basis for Seasonal Forecasting", by H. A. Hunt; Bulletin No. 18, "Foreshadowing Monsoonal Rains in Northern Australia"; Bulletin No. 19, "Thunderstorms in Australia"; Bulletin No. 20, "Zones of Relative Physical Comfort in Australia"; a Paper on "Frost Risks and Frost-Forecasting"; Booklet containing Meteorological Data for certain Australian Localities; and a volume of "Results of Rainfall Observations made in Tasmania".

3. **General Description of Australia.**—A considerable portion (0.530) of three divisions of Australia is north of the tropic of Capricorn—that is to say, within the States of Queensland and Western Australia, and the Northern Territory; no less than 1,149,320 square miles belong to the tropical zone, and 1,020,720 to the temperate zone. The whole area of Australia within the temperate zone, however, is 1,825,261 square miles; thus the tropical part is about 0.386, or about five-thirteenths of the whole, or the "temperate" region is half as large again as the "tropical" (more accurately 1.588). By reason of its insular geographical position, and the absence of striking physical features, Australia is, on the whole, less subject to extremes of weather than are regions of similar area in other parts of the globe, and latitude for latitude Australia is, on the whole, more temperate.

The altitudes of the surface of Australia range up to a little over 7,300 feet, hence its climate embraces a great many features, from the characteristically tropical to what is essentially alpine, a fact indicated in some measure by the name Australian Alps given to the southern portion of the great Dividing Range.

On the coast, the rainfall is often abundant and the atmosphere moist, but in some portions of the interior it is very limited, and the atmosphere dry. The distribution of forest, therefore, with its climatic influence, is very uneven. In the interior, in places, there are fine belts of trees, but there are large areas also which are treeless, and where the air is hot and parching in summer. Again, on the coast, even so far south as latitude 35°, the vegetation is tropical in its luxuriance, and to some extent also in character. Climatologically, therefore, Australia may be said to present a great variety of features.

* Prepared from data supplied by the Commonwealth Meteorologist, W. S. Watt, Esquire.

4. **Meteorological Divisions.**—(i) *General.* Reference to the divisions adopted by the Commonwealth Meteorologist will be found in Official Year Book No. 22, p. 41.

(ii) *Special Climatological Stations.* The latitudes, longitudes and altitudes of special stations, the climatological features of which are graphically represented hereinafter, are as follows :—

SPECIAL CLIMATOLOGICAL STATIONS—AUSTRALIA.

Locality.	Height above Sea Level.	Latitude. S.	Longitude. E.	Locality.	Height above Sea Level.	Latitude. S.	Longitude E.
	Feet.	deg. min.	deg. min.		Feet.	deg. min.	deg. min.
Perth ..	197	31 57	115 50	Canberra ..	1,920	35 20	149 15
Adelaide ..	140	34 56	138 35	Darwin ..	97	12 28	130 51
Brisbane ..	137	27 28	153 2	Alice Springs	1,926	23 38	133 37
Sydney ..	138	33 52	151 12	Dubbo ..	870	32 18	148 35
Melbourne ..	115	37 49	144 58	Laverton, W.A.	1,530	28 40	122 23
Hobart ..	177	42 53	147 20	Coolgardie ..	1,389	30 57	121 10

5. **Temperatures.**—(i) *Comparisons with other Countries.* In respect of Australian temperatures generally, it may be pointed out that the mean annual isotherm for 70° Fahrenheit extends in South America and South Africa as far south as latitude 33°, while in Australia it reaches only as far south as latitude 30°, thus showing that, on the whole, Australia has latitude for latitude a more temperate climate than other places in the Southern Hemisphere.

The comparison is even more favourable when the Northern Hemisphere is included, for in the United States the 70° isotherm extends in several of the western States as far north as latitude 41°. In Europe, the same isotherm reaches almost to the southern shores of Spain, passing, however, afterwards along the northern shores of Africa till it reaches the Red Sea, when it bends northward along the eastern shore of the Mediterranean till it reaches Syria. In Asia, nearly the whole of the land area south of latitude 40° N. has a higher temperature than 70°.

The extreme range of temperature is less than 100° over practically the whole of Australia, that figure being only slightly exceeded at a very few places; it is mostly 70° to 90° over inland areas, and somewhat less on the coast. In parts of Asia and North America, the extreme range exceeds 130° and 150° in some localities.

Along the northern shores of Australia the temperatures are very equable. At Darwin, for example, the difference in the means for the hottest and coldest months is only 8.5°, and the extreme readings for the year, or the highest maximum on record and the lowest minimum, show a difference of under 50°.

(ii) *Hottest and Coldest Parts.* A comparison of the temperatures recorded at coast and inland stations shows that, in Australia, as in other continents, the range increases with increasing distance from the coast.

In the interior of Australia, and during exceptionally dry summers, the temperature occasionally reaches or exceeds 120° in the shade, and during the dry winters the major portion of the country to the south of the tropics is subject to ground frosts. The hottest area of the continent is situated in the northern part of Western Australia about the Marble Bar and Nullagine goldfields, where the maximum shade temperature during the summer sometimes exceeds 100° continuously for days and weeks. The coldest part of Australia is the extreme south-east of New South Wales and extreme east of Victoria—the region of the Australian Alps. Here the temperature seldom, if ever, reaches 100° even in the hottest of seasons, while in winter, readings slightly below zero are occasionally recorded.

Tasmania as a whole enjoys a most moderate and equable range of temperature throughout the year, although occasionally hot winds may cross the Straits and cause the temperature to rise to 100° in the low-lying parts.

(iii) *Monthly Maximum and Minimum Temperatures.* The normal monthly maximum and minimum temperatures can be best shown by means of graphs, which exhibit the nature of the fluctuation of each for all available years. In the diagram herein for nine representative places in Australia, the upper heavy curves show the mean maximum, and the lower heavy curves the mean minimum temperatures based upon daily observations, while the other curves show the humidities.

6. **Humidity.**—After temperature, humidity is the most important element of climate, as regards its effect on human comfort, rainfall supply, and in connexion with engineering problems.

In this publication the *absolute humidity* has been graphically represented in inches of vapour pressure (i.e., that portion of the barometric pressure due to vapour). It is this total quantity of moisture in the air which affects personal comfort, plays an important part in varying the density of the atmosphere, and in heating and refrigerating processes. The more commonly quoted value, called the *relative humidity*, refers to the ratio which the actual moisture contents of the air bear to the total amount possible if saturation existed at the given temperature, and is usually quoted as a percentage. The relative humidity is an important factor in all drying operations, but is much less important than the absolute humidity as affecting animal life.

The mean monthly vapour pressure has also been added to the tables of climatological data for the capital cities included herein.

The normal monthly values of vapour pressure, it should be noted, combine to make the annual curve for this element which is comparable with the maximum and minimum temperature curves, but the relative humidities consisting as they do of the extremes for each month, do not show the normal annual fluctuation which would be approximately midway between the extremes.

The order of stations in descending values of vapour pressure is Darwin, Brisbane, Sydney, Perth, Melbourne, Adelaide, Canberra, Hobart and Alice Springs, while the relative humidity diminishes in the order, Sydney, Canberra, Darwin, Melbourne, Brisbane, Hobart, Perth, Adelaide and Alice Springs.

7. **Evaporation.**—(i) *General.* The rate and quantity of evaporation in any territory is influenced by the prevailing temperature, and by atmospheric humidity, pressure and movement. In Australia, the question is of perhaps more than ordinary importance, since in its drier regions water has often to be conserved in "tanks"* and dams. The magnitude of the economic loss by evaporation will be appreciated from the tabular records herein, which show that the yearly amount varies from about 31 inches at Hobart to more than 100 inches in the Central parts of Australia. Over the *inland* districts of the continent it has been calculated that evaporation equals the rainfall where the annual totals are about 36 inches, the variations above and below this quantity being inverse.

(ii) *Monthly Evaporation Curves.* The diagrams herein showing the mean monthly evaporation in various parts of Australia disclose how characteristically different are the amounts for the several months in different localities.

(iii) *Loss by Evaporation.* In the interior of Australia the possible evaporation is greater than the actual rainfall. Since the loss by evaporation depends largely on the exposed area, tanks and dams so designed that the surface shall be a minimum are advantageous. Further, the more protected from the direct rays of the sun and from winds, by means of suitable tree planting, the less will be the loss by evaporation. These matters are naturally of more than ordinary concern in the drier districts of Australia.

8. **Rainfall.**—(i) *General.* The rainfall of any region is determined mainly by the direction and route of the prevailing winds, by the varying temperatures of the earth's surface over which they blow, and by its physiographical features.

Australia lies within the zones of the south-east trades and prevailing westerly winds. The southern limit of the south-east trade strikes the eastern shores at about 30° south latitude, and, with very few exceptions, the heaviest rains of the Australian

* In Australia, artificial storage ponds or reservoirs are called "tanks."

continent are precipitated along the Pacific slopes to the north of that latitude, the varying quantities being more or less regulated by the differences in elevation of the shores and of the chain of mountains upon which the rain-laden winds blow from the New South Wales northern border to Thursday Island. The converse effect is exemplified on the north-west coast of Western Australia, where the prevailing winds blowing from the interior of the continent instead of from the ocean, result in the lightest coastal rain in Australia.

The westerly winds, which skirt the southern shores, are responsible for the reliable, generally light to moderate rains enjoyed by the south-western portion of Western Australia, by the agricultural areas of South Australia, by a great part of Victoria, and by the whole of Tasmania.

(ii) *Distribution of Rainfall.* The average annual rainfall map of Australia herein shows that the heaviest yearly falls—over 50 inches—occur over the coastal region of the Northern Territory, over most of the Cape York Peninsular and coastal districts of Queensland, over many of the coastal areas of New South Wales, and the western parts of Tasmania. A great part of the interior of the continent, stretching from the far west of New South Wales and the south-west of Queensland to the vicinity of Shark Bay in Western Australia, has a very low average rainfall of less than 10 inches a year. Between these two regions of heavy and very low rainfall are the extensive areas which experience useful to good rains, and in the southern and eastern parts of which are found the best country and most of the population and primary production.

(iii) *Factors Determining Occurrence, Intensity and Seasonal Distribution of Rainfall.* Reference has already been made to the frequent rains occurring in the north-eastern coastal districts of Queensland with the prevailing south-east trade winds and to similar rains in the west of Tasmania with the prevailing westerly winds. Other rains in Australia are associated mainly with tropical and southern depressions.

The former chiefly affect the northern, eastern, and to some extent the central parts of the continent and operate in an irregular manner during the warmer half of the year, but principally from December to March. They vary considerably in activity and scope from year to year, occasionally developing into severe storms off the east and north-west coasts. Tropical rainstorms sometimes cover an enormous area, half of the continent on occasions receiving moderate to very heavy falls during a period of a few days. Rain is also experienced, with some regularity, with thunderstorms in tropical areas, specially near the coast. All these tropical rains, however, favour mostly the northern and eastern parts of the area referred to : the other parts further inland receive lighter, less frequent and less reliable rainfall. With the exception of districts near the east coast, where some rain falls in all seasons, the tropical parts of the continent receive useful rains only on rare occasions from May to September.

The southern depressions are most active in the winter—June to August—and early spring months. The rains associated with them are fairly reliable and frequent over Southern Australia and Tasmania, and provide during that period the principal factor in the successful growing of wheat. These depressions also operate with varying activity during the remainder of the year, but the accompanying rains are usually lighter. The *southern rains favour chiefly the south-west of Western Australia, the agricultural* districts of South Australia, Victoria, Tasmania and the southern parts of New South Wales. They sometimes extend into the drier regions of the interior, but only infrequently and with irregular rains.

The map showing mean monthly distribution of rainfall over Australia gives information on the amount and occurrence of rain in graphic form.

(iv) *Wettest and Driest Regions.* The wettest known part of Australia is on the north-east coast of Queensland, between Port Douglas and Cardwell, where three stations situated on, or adjacent to, the Johnstone and Russell Rivers have an average annual rainfall of between 142 and 165 inches. The maximum and minimum falls there are :— Goondi, 241.53 in 1894 and 67.88 inches in 1915, or a range of 173.65 inches ; Innisfail, 211.24 in 1894 and 69.87 inches in 1902, or a range of 141.37 inches ; Harvey Creek, 254.77 in 1921 and 80.47 inches in 1902, or a range of 174.30 inches.

On four occasions more than 200 inches have been recorded at Goondi, the last of these being in 1910, when 204.82 inches were registered. The record at this station covers a period of 50 years.

Harvey Creek, in the shorter period of 29 years, has four times exceeded 200 inches, the total for 1921 being 254.77 inches, and at the South Johnstone Sugar Experiment Station, where a gauge was established seventeen years ago, 202.52 inches were recorded in 1921.

In Tasmania the wettest part is in the West Coast region, the mean annual rainfall at Lake Margaret being 145.25 inches, with a maximum of 175.12 inches in 1924.

The driest known part of the continent is in the Lake Eyre district in South Australia (the only part of the continent below sea level), where the annual average is only 5 inches, and where the fall rarely exceeds 10 inches for the twelve months.

The inland districts of Western Australia were at one time regarded as the driest part of Australia, but authentic observations in recent years over settled districts in the east of that State show that the annual average is from 10 to 12 inches.

(v) *Quantities and Distribution of Rainfall.* The general distribution is best seen from the rainfall map herein, which shows the areas subject to average annual rainfalls lying between certain limits. The areas enjoying varying quantities of rainfall determined from the latest available information are shown in the following table :—

AVERAGE ANNUAL RAINFALL DISTRIBUTION.

Average Annual Rainfall.	N.S.W. (a)	Victoria.	Queensland.	South Australia	Northern Territory	Western Australia.	Tasmania. (b)	Total. (b)
	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.
Under 10 inches	48,749	nil	80,496	310,660	140,500	486,952	nil	1,067,357
10—15 ,,	78,454	19,270	81,549	36,460	132,780	255,092	nil	603,605
15—20 ,,	55,762	13,492	111,833	19,940	63,026	94,101	304	358,458
20—25 ,,	45,140	14,170	143,610	8,620	49,157	44,340	3,844	308,881
25—30 ,,	30,539	15,579	99,895	3,258	41,608	31,990	3,016	225,885
30—40 ,,	33,557	14,450	61,963	1,036	37,642	59,520	5,027	213,195
Over 40 ,,	18,171	10,923	91,154	96	58,907	3,925	11,247	194,423
Total area ..	310,372	87,884	670,500	380,070	523,620	975,920	23,438	2,971,804

(a) Including Federal Capital Territory. (b) Over an area of 2,777 square miles no records are available.

Referring first to the capital cities the records of which are given in the next table, it will be seen that Sydney, with a normal rainfall of 47.48 inches, occupies the chief place ; Brisbane, Perth, Melbourne, Hobart, Canberra and Adelaide follow in that order, Adelaide with 21.15 inches being the driest. The extreme range from the wettest to the driest year is greatest at Brisbane (72.09 inches) and least at Adelaide (19.48 inches).

In order to show how the rainfall is distributed throughout the year in various parts of the continent, the figures for representative towns have been selected. (*See* map.) The figures for Darwin, typical of the Northern Territory, show that nearly the whole of the rainfall occurs there in the summer months, while little or none falls in the middle of the year. The figures for Perth, as representing the south-western part of the continent, are the reverse, for while the summer months are dry, the winter ones are very wet. In Melbourne and Hobart the rain is fairly well distributed throughout the twelve months, with a maximum in October for the former, and in November for the latter. The records at Alice Springs and Daly Waters indicate that in the central parts of Australia most of the rain occurs from November to March. In Queensland, the heaviest rains fall in the summer months, but good averages are also maintained during the other seasons in eastern parts.

On the coast of New South Wales, the first six months of the year are the wettest, with a maximum in the autumn ; the averages during the last six months are fair, and moderately uniform. Generally it may be said that approximately one-third of the

area of the continent, principally in the eastern and northern parts, enjoys an annual average rainfall of from 20 to 50 or more inches, the remaining two-thirds averaging from 5 to 20 inches.

(vi) *Curves of Rainfall and Evaporation.* The relative amounts of rainfall and evaporation at different times through the year are clearly indicated in the graphs herein. Inspection thereof will show how large is the evaporation when water is fully exposed to the direct rays of the sun and to wind.

(vii) *Tables of Rainfall.* The table of rainfall for a long period of years for each of the various Australian capitals affords information as to the variability of the fall in successive years, and the list of the more remarkable falls furnishes information as to what may be expected on particular occasions.

RAINFALL—AUSTRALIAN CAPITAL CITIES.

Year.	CANBERRA.(a)		PERTH.		ADELAIDE.		BRISBANE.		SYDNEY.		MELBOURNE.		HOBART.	
	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.
	in.		in.		in.		in.		in.		in.		in.	
1902 ..	..	..	27.06	93	16.02	123	16.17	87	43.07	180	23.08	102	21.85	150
3 ..	..	..	35.69	140	25.47	134	49.27	136	38.62	173	28.43	130	25.86	139
4 ..	..	..	34.35	125	20.31	117	33.23	124	45.93	158	29.72	128	22.41	139
5 ..	..	..	34.61	116	22.28	131	36.76	108	35.03	145	25.64	129	32.09	168
6 ..	..	..	32.37	121	26.51	127	42.85	125	31.89	160	22.29	114	23.31	155
7 ..	..	..	40.12	132	17.78	125	31.46	119	31.32	132	22.26	102	25.92	166
8 ..	..	..	30.52	106	24.56	125	44.01	125	45.65	167	17.72	130	16.50	148
9 ..	..	..	39.11	107	27.69	138	34.06	111	32.45	177	25.86	171	27.29	170
1910 ..	..	..	37.02	135	24.62	116	49.00	133	46.91	160	24.61	167	25.22	205
11 ..	..	..	23.38	108	15.99	127	35.21	128	50.24	155	36.61	168	26.78	193
12 ..	19.27	76	27.85	123	19.57	116	41.30	114	47.51	172	20.37	157	23.14	181
13 ..	16.38	71	38.28	141	18.16	102	40.81	115	57.70	141	21.17	157	19.36	165
14 ..	18.49	81	20.21	128	11.39	91	33.99	141	56.42	149	18.57	129	15.42	154
15 ..	22.31	87	43.61	164	19.38	117	25.66	93	34.83	117	20.95	167	20.91	196
16 ..	31.26	119	35.16	128	28.16	142	52.80	136	44.91	161	38.04	170	43.39	203
17 ..	29.70	144	45.64	146	28.90	153	40.92	127	52.40	151	30.57	171	30.62	214
18 ..	18.27	95	39.58	138	17.41	107	24.95	121	42.99	149	27.13	160	26.04	179
19 ..	16.31	85	30.66	120	17.21	108	19.36	96	58.71	152	24.89	141	22.48	153
20 ..	29.30	107	40.35	124	26.70	119	39.72	122	43.42	159	28.27	162	18.00	182
21 ..	..	..	41.09	135	22.64	100	54.31	167	43.34	140	29.76	154	18.04	159
22 ..	..	..	31.86	135	23.20	117	35.82	109	39.35	136	25.02	151	28.27	189
23 ..	..	..	44.47	134	29.79	139	23.27	93	37.01	123	22.64	158	32.93	198
24 ..	25.95	68	33.79	119	23.44	143	41.08	114	37.01	136	36.48	171	28.76	197
25 ..	33.71	59	31.41	126	21.91	118	53.10	139	50.35	145	17.57	144	22.40	171
26 ..	20.53	97	49.22	167	22.20	116	30.82	111	37.07	127	20.81	149	25.79	187
27 ..	21.40	83	36.59	133	16.92	101	62.08	130	48.56	138	17.98	135	20.02	183
28 ..	17.82	96	44.88	140	19.43	107	52.64	145	40.07	130	24.09	151	30.23	205
29 ..	22.34	88	36.77	172	17.51	119	39.78	118	57.90	129	28.81	168	26.55	194
30 ..	16.52	86	39.80	129	18.65	116	41.22	144	44.47	141	25.41	145	19.38	152
31 ..	24.25	105	39.18	118	22.26	146	66.72	136	49.22	153	28.63	164	27.17	179
32 ..	19.13	107	39.40	107	25.04	141	24.79	97	37.47	146	31.08	179	30.29	155
33 ..	20.30	88	32.47	116	22.12	130	49.71	118	42.71	153	22.28	136	23.18	173
34 ..	35.89	118	40.61	120	20.24	125	54.26	117	64.91	183	33.53	157	23.17	194
35 ..	24.40	102	32.28	129	23.45	140	34.64	111	30.97	131	29.98	183	32.22	196
36 ..	29.49	121	30.64	118	19.34	121	21.77	101	30.22	130	24.30	187	19.60	178
Average	23.32	95	34.81	121	21.15	123	41.88	127	47.48	152	26.19	140	24.01	153
No. of Years	22	22	61	61	98	98	87	77	97	97	93	81	94	93

(a) Records commenced in 1912; are not available for the years 1921 to 1923.

NOTE.—The above average rainfall figures for Brisbane, Sydney and Melbourne differ slightly from the mean annual falls given in the Climatological Tables and on page 54, which are for a less number of years. Annual totals from 1860 to 1901 inclusive will be found in Official Year Book No. 15, page 53.

9. **Remarkable Falls of Rain.**—The following are the most remarkable falls of rain in the various States and in the Northern Territory which have occurred within a period of twenty-four hours. For other very heavy falls at various localities reference may be made to Official Year Book No. 14, pp. 60 to 64 and No. 22, pp. 46 to 48 :—

HEAVY RAINFALLS—NEW SOUTH WALES, UP TO 1936, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		in.			ins.
Broger's Creek ..	14 Feb., 1898	20.05	South Head (near Sydney) ..	16 Oct., 1844	20.41
,, ,, ..	13 Jan., 1911	20.83	Towamba ..	5 Mar., 1893	20.00
Cordeaux River ..	14 Feb., 1898	22.58	Viaduct Creek ..	15 Mar., 1936	20.00
Morpeth	9 Mar., 1893	21.52			

HEAVY RAINFALLS—QUEENSLAND, UP TO 1936, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			Ins.
Babinda (Cairns) ..	2 Mar., 1935	24.14	Mackay ..	21 Jan., 1918*a*	24.70
Buderim Mountain	11 Jan., 1898	26.20	Macnade Mill ..	6 ,, 1901	23.33
Crohamhurst (Blackall Range)	2 Feb., 1893	35.71	Plane Creek (Mackay) ..	26 Feb., 1913	27.73
Deeral	2 Mar., 1935	27.60	Port Douglas ..	1 Apr., 1911	31.53
Goondi	30 Jan., 1913	24.10	Tully	12 Feb., 1927	23.86
Harvey Creek ..	3 ,, 1911	27.75	Woodlands (Yepp'n)	31 Jan., 1893	23.07
Kuranda (Cairns) ..	2 Apr., 1911	28.80	Yarrabah ..	2 Apr., 1911	30.65

(*a*) 37½ hours.

HEAVY RAINFALLS—WESTERN AUSTRALIA, UP TO 1936, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Balla Balla ..	21 Mar., 1899	14.40	Pilbara	2 Apr., 1898	14.04
Boodarie ..	21 Jan., 1896	14.53	Roebuck Plains ..	6 Jan., 1917	22.36
Broome	6 ,, 1917	14.00	Thangoo ..	17-19 Feb.,'96	24.18
Derby	7 Jan., 1917	16.47	Whim Creek ..	3 Apr., 1898	29.41
Fortescue ...	3 May, 1890	23.36	Winderrie ..	17 Jan., 1923	14.23

HEAVY RAINFALLS—NORTHERN TERRITORY, UP TO 1936, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Bathurst Island Mission ..	7 Apr., 1925	11.85	Brock's Creek ..	24 Dec., 1915	14.33
Birrimbah ..	6 Mar., 1935	16.50	Cape Don ..	13 Jan., 1934	13.58
Borroloola ..	14 Mar., 1899	14.00	Darwin	7 Dec., 1915	11.67

HEAVY RAINFALLS—SOUTH AUSTRALIA, UP TO 1936, INCLUSIVE.

Name of Town or Locality.	Date.	Amount.
		ins.
Wilmington	28 Feb., 1921	3.97
	1 Mar., 1921	7.12

HEAVY RAINFALLS.—VICTORIA, UP TO 1936, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Apollo Bay ..	28 Mar., 1932	11.08	Mt. Buffalo ..	6 June, 1917	8.53
Cann River ..	27 Feb., 1919	9.56	Murrungowar ..	10 July, 1932	14.65
Hazel Park ..	1 Dec., 1934	10.50	Olinda	1 Dec., 1934	9.10
Kalorama ..	1 ,, ,,	10.05	Tambo Crossing ..	13 July, 1923	8.89
Korumburra ..	1 ,, ,,	8.51	Tonghi Creek ..	27 Feb., 1919	9.90

HEAVY RAINFALLS—TASMANIA, UP TO 1936, INCLUSIVE.

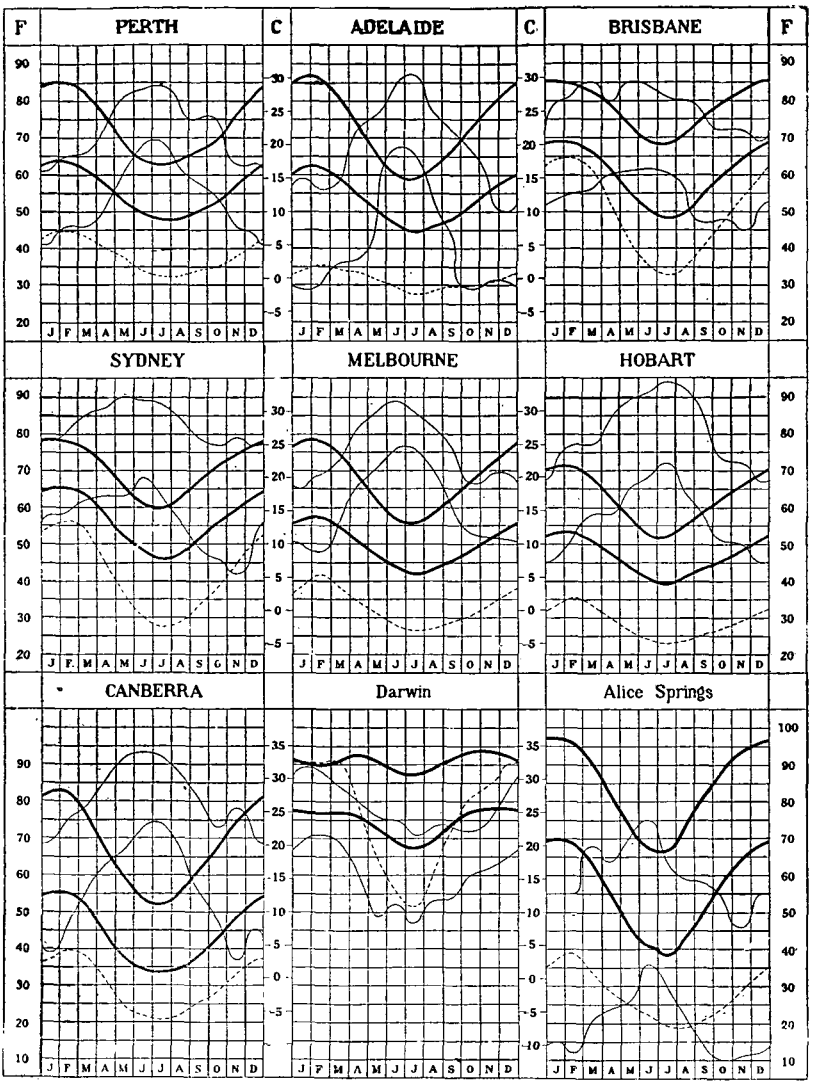
Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Cullenswood ..	5 Apr., 1929	11.12	Riana	5 Apr., 1929	11.08
Gould's Country ..	8-10 Mar., '11	15.33	The Springs ..	30-31 Jan., '16	10.75
Lottah	8-10 Mar., '11	18.10	Triabunna ..	5 June, 1923	10.20
Mathinna ..	5 Apr., 1929	13.25			

HEAVY RAINFALLS—FEDERAL CAPITAL TERRITORY, UP TO 1936, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Canberra ..	27 May, 1925	6.84	Uriarra	27 May, 1925	6.57
Cotter Junction ..	,, ,,	7.13			

10. **Snowfall.**—Light snow has been known to fall occasionally as far north as latitude 31° S., and from the western to the eastern shores of the continent. During exceptional seasons, it has fallen simultaneously over two-thirds of the State of New South Wales, and has extended at times along the whole of the Great Dividing Range, from its southern extremity in Victoria as far north as Toowoomba in Queensland. During the winter, for several months, snow covers the ground to a great extent on the Australian Alps, where also the temperature falls below zero Fahrenheit during the night. In the ravines around Kosciusko and similar localities the snow never entirely disappears.

ANNUAL FLUCTUATIONS OF NORMAL MAXIMUM AND MINIMUM TEMPERATURE AND HUMIDITY.



EXPLANATION.—The upper and lower heavy lines in each graph represent the mean maximum and mean minimum temperatures respectively. The Fahrenheit temperature scales are shown on the outer edge of the sheet under " F " and the centigrade scales in the two inner columns under " C."

The broken line shows the normal absolute humidity in the form of 9 a.m. vapour pressures for which the figures in the outer " F " columns represent hundredths of an inch of barometric pressure.

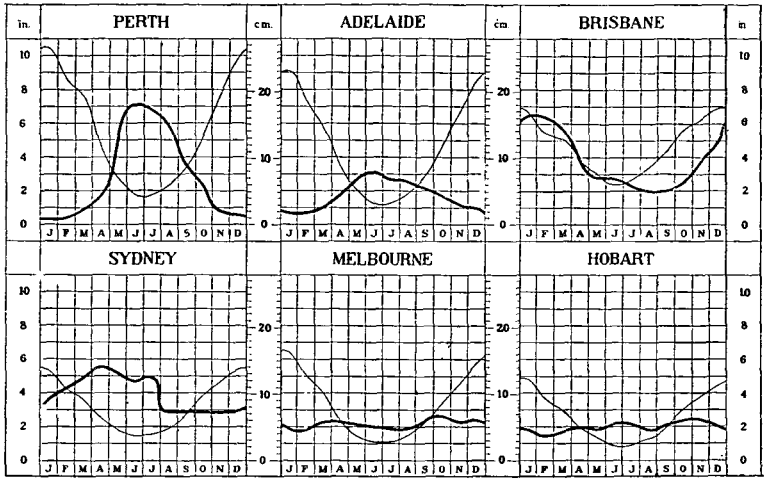
The upper and lower fine lines join the greatest and the least monthly means of relative humidity respectively, the figures under the outer columns " F " indicating percentage values.

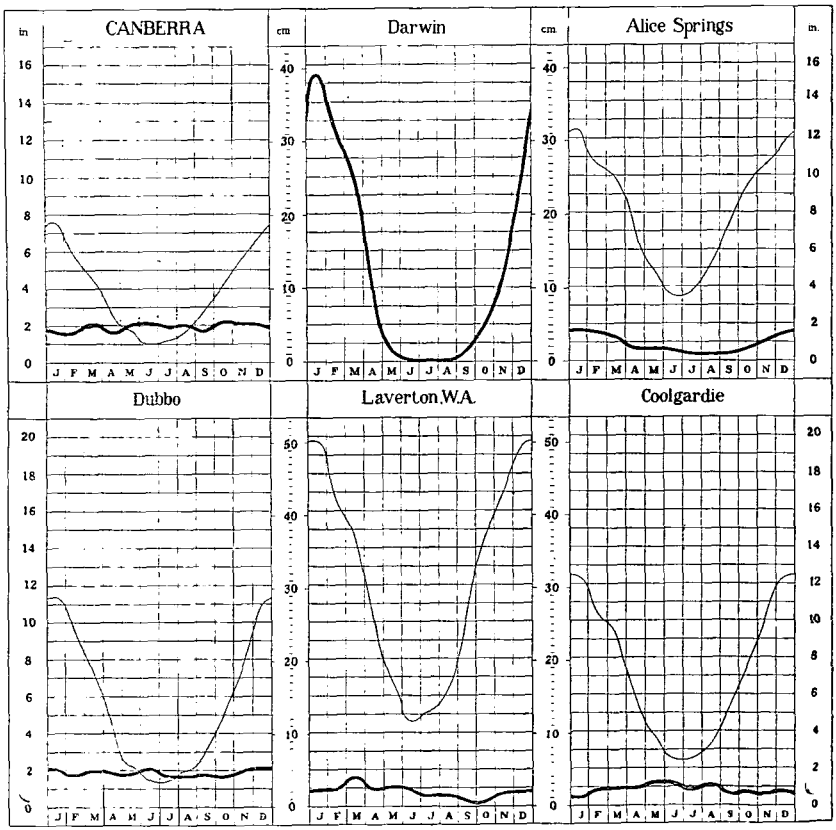
The curves for temperature and vapour pressure joining the mean monthly values serve to show the annual fluctuation of these elements, but the relative humidity graphs joining the extreme values for each month do not indicate any normal annual variation.

Comparison of the maximum and minimum temperature curves affords a measure of the mean diurnal range of temperature. At Perth in the middle of January, for instance, there is normally a range of 21° from 63° F. to 84° F., but in July it is only 15° from 48° F. to 63° F.

The relative humidity curves illustrate the extreme range of the mean monthly humidity over a number of years.

MEAN MONTHLY RAINFALL AND EVAPORATION.





EXPLANATION.—On the preceding graphs thick lines denote rainfall, and thin lines evaporation, and show the fluctuation of the mean rate of fall or evaporation *per month* throughout the year. The results plotted from the Climatological Tables herein, are shown in inches (see the outer columns), and the corresponding metric scale (centimetres) is shown in the two inner columns. The evaporation is not given for Darwin.

At Perth, Adelaide, Brisbane, Melbourne, Hobart, Canberra, Alice Springs, and Coolgardie the results have been obtained from jacketed tanks sunk in the ground. At Sydney and Dubbo sunken tanks without water jackets are used, whilst at Laverton (W.A.) the records are taken from a small portable jacket evaporation dish of 8 inches in diameter.

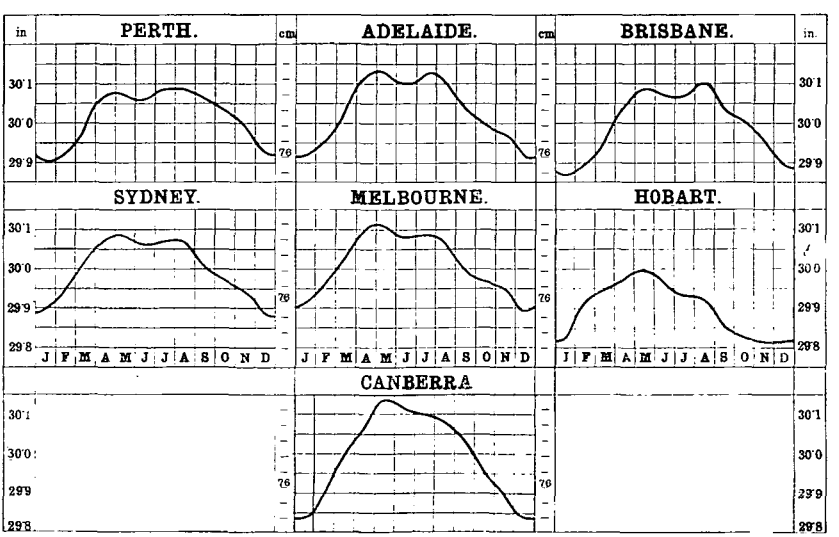
The distance for any date from the zero line to the curve represents the average number of inches, reckoned as per month, of rainfall at that date. Thus, taking the curve for Adelaide in the middle of January, the rain falls on the average at the rate of about three-fourths of an inch per month or, say, at the rate of about 9 inches per year. In the middle of June it falls at the rate of a little over 3 inches per month, or, say, at the rate of about 37 inches per year. At Dubbo, the evaporation is at the rate of nearly 11½ inches per month about the middle of January, and only about 1½ inches at the middle of June.

The mean annual rainfall and evaporation at the places indicated are given in the appended table

MEAN ANNUAL RAINFALL AND EVAPORATION.

Place.	Rainfall.	Evaporation.	Place.	Rainfall.	Evaporation.
	In.	In.		In.	In.
Perth ..	34.81	66.28	Canberra ..	23.32	45.03
Adelaide ..	21.15	55.23	Darwin ..	59.51	—
Brisbane ..	45.04	56.16	Alice Springs ..	10.53	96.66
Sydney ..	47.10	39.39	Dubbo ..	22.04	66.37
Melbourne ..	25.70	39.05	Laverton, W.A.	9.23	145.19
Hobart ..	24.01	31.18	Coolgardie ..	10.14	85.37

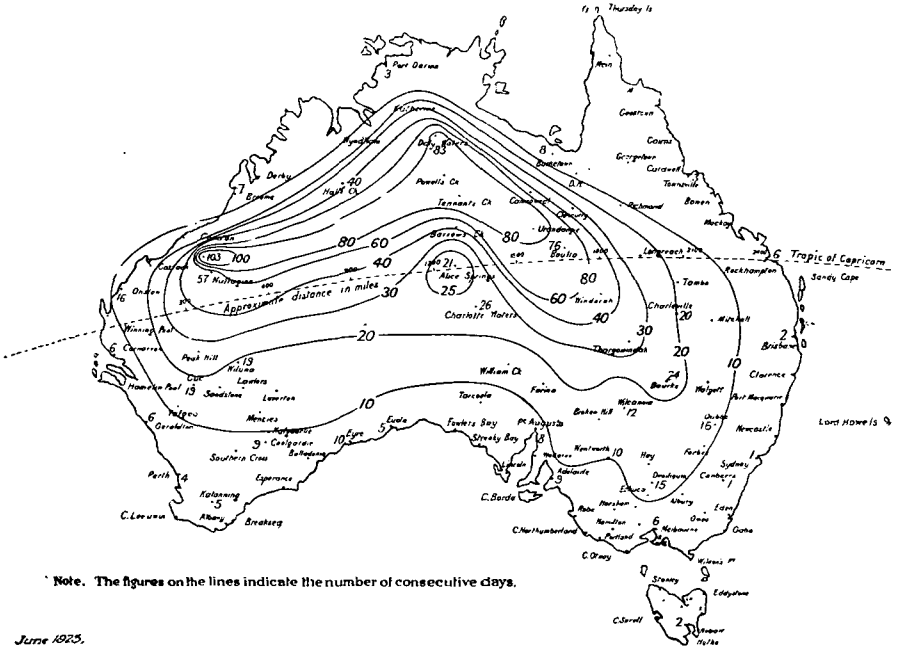
MEAN BAROMETRIC PRESSURE.—CAPITAL CITIES.



EXPLANATION.—The lines representing the yearly fluctuations of barometric pressure at the State capital cities are means for long periods, and are plotted from the Climatological Tables herein. The pressures are shown in inches on about 2½ times the natural scale, and the corresponding pressures in centimetres are also shown in the two inner columns, in which each division represents one millimetre.

Taking the Brisbane graph for purposes of illustration, it will be seen that the mean pressure in the middle of January is about 29.87 inches, and there are maxima in the middle of May and August of about 30.09 inches.

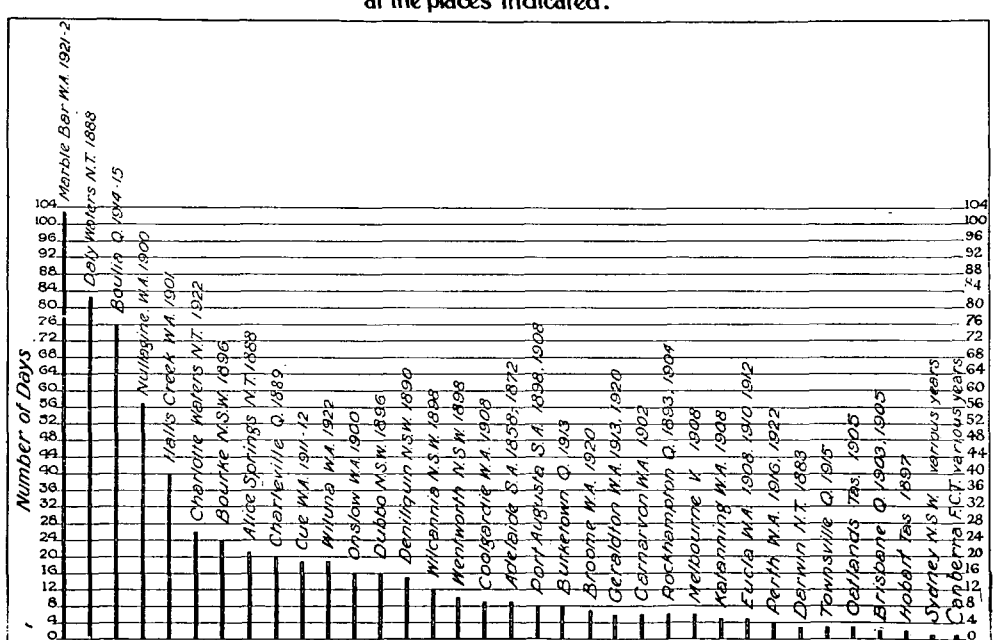
Area affected and period of duration of the Longest Heat Waves when the Maximum Temperature for consecutive 24 hours reached or exceeded 100° Fah.

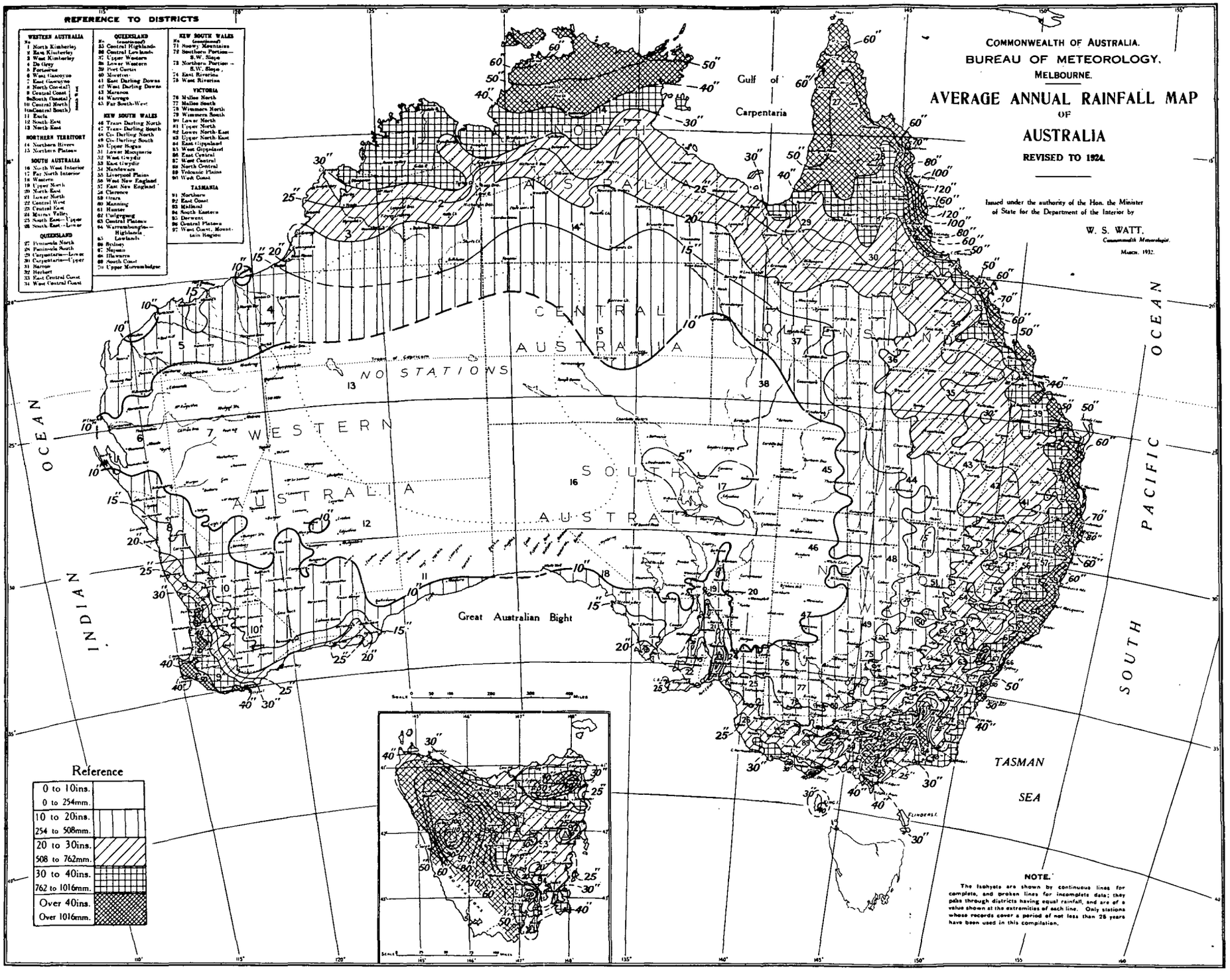


Note. The figures on the lines indicate the number of consecutive days.

June 1925.

Greatest number of consecutive days on which the Shade Temperature was over 100° Fah. at the places indicated.




COMMONWEALTH OF AUSTRALIA.
BUREAU OF METEOROLOGY.
MELBOURNE.
AVERAGE ANNUAL RAINFALL MAP
OF
AUSTRALIA
REVISED TO 1924.
Issued under the authority of the Hon. the Minister of State for the Department of the Interior by
W. S. WATT,
Commonwealth Meteorologist.
March, 1932.
REFERENCE TO DISTRICTS
WESTERN AUSTRALIA
1 North Kimberley
2 East Kimberley
3 West Kimberley
4 De Grey
5 Fortescue
6 West Gascoyne
7 East Gascoyne
8 North Coastal
9 Central Coast
10 South Coastal
11 Esth
12 South-East
13 North-East
NORTHERN TERRITORY
14 Northern Rivers
15 Northern Plateau
SOUTH AUSTRALIA
16 North West Interior
17 Far North Interior
18 Western
19 Upper North
20 North East
21 Lower North
22 Central West
23 Central East
24 Murray Valley
25 South East—Upper
26 South East—Lower
QUEENSLAND
27 Peninsula North
28 Peninsula South
29 Carpentaria—Lower
30 Carpentaria—Upper
31 Barron
32 Herbert
33 East Central Coast
34 West Central Coast
QUEENSLAND
35 Central Highlands
36 Central Lowlands
37 Upper Western
38 Lower Western
39 Port Curtis
40 Moreton
41 East Darling Downs
42 West Darling Downs
43 Maranoa
44 Warrego
45 Far South-West
NEW SOUTH WALES
46 Trans Darling North
47 Trans Darling South
48 Cis-Darling North
49 Cis-Darling South
50 Upper Namoi
51 Lower Macquarie
52 West Gwydir
53 East Gwydir
54 Northwestern
55 Liverpool Plains
56 West New England
57 East New England
58 Clarence
59 Orara
60 Manning
61 Hunter
62 Darlingtung
63 Central Plateau
64 Warrumbungles—Highlands
65 Lowlands
66 Sydney
67 Nepean
68 Illawarra
69 South Coast
70 Upper Murrumbidgee
NEW SOUTH WALES
71 Snowy Mountains
72 Southern Portion—S.W. Slope
73 Northern Portion—S.W. Slope
74 East Riverina
75 West Riverina
VICTORIA
76 Mallee North
77 Mallee South
78 Wimmera North
79 Wimmera South
80 Lower North
81 Upper North
82 Lower North-East
83 Upper North-East
84 East Gippsland
85 West Gippsland
86 East Central
87 West Central
88 North Central
89 Volcanic Plains
90 West Coast
TASMANIA
91 Northern
92 East Coast
93 Midland
94 South Eastern
95 Derwent
96 Central Plateau
97 West Coast, Mountain Region
NO STATIONS
Gulf of Carpentaria
Great Australian Bight
WESTERN AUSTRALIA
SOUTH AUSTRALIA
CENTRAL AUSTRALIA
QUEENSLAND
NEW SOUTH WALES
INDIAN OCEAN
PACIFIC OCEAN
TASMAN SEA
Reference
0 to 10ins. 0 to 254mm.
10 to 20ins. 254 to 508mm.
20 to 30ins. 508 to 762mm.
30 to 40ins. 762 to 1016mm.
Over 40ins. Over 1016mm.
NOTE.
The Isohyets are shown by continuous lines for complete, and broken lines for incomplete data; they pass through districts having equal rainfall, and are of a value shown at the extremities of each line. Only stations whose records cover a period of not less than 26 years have been used in this compilation.

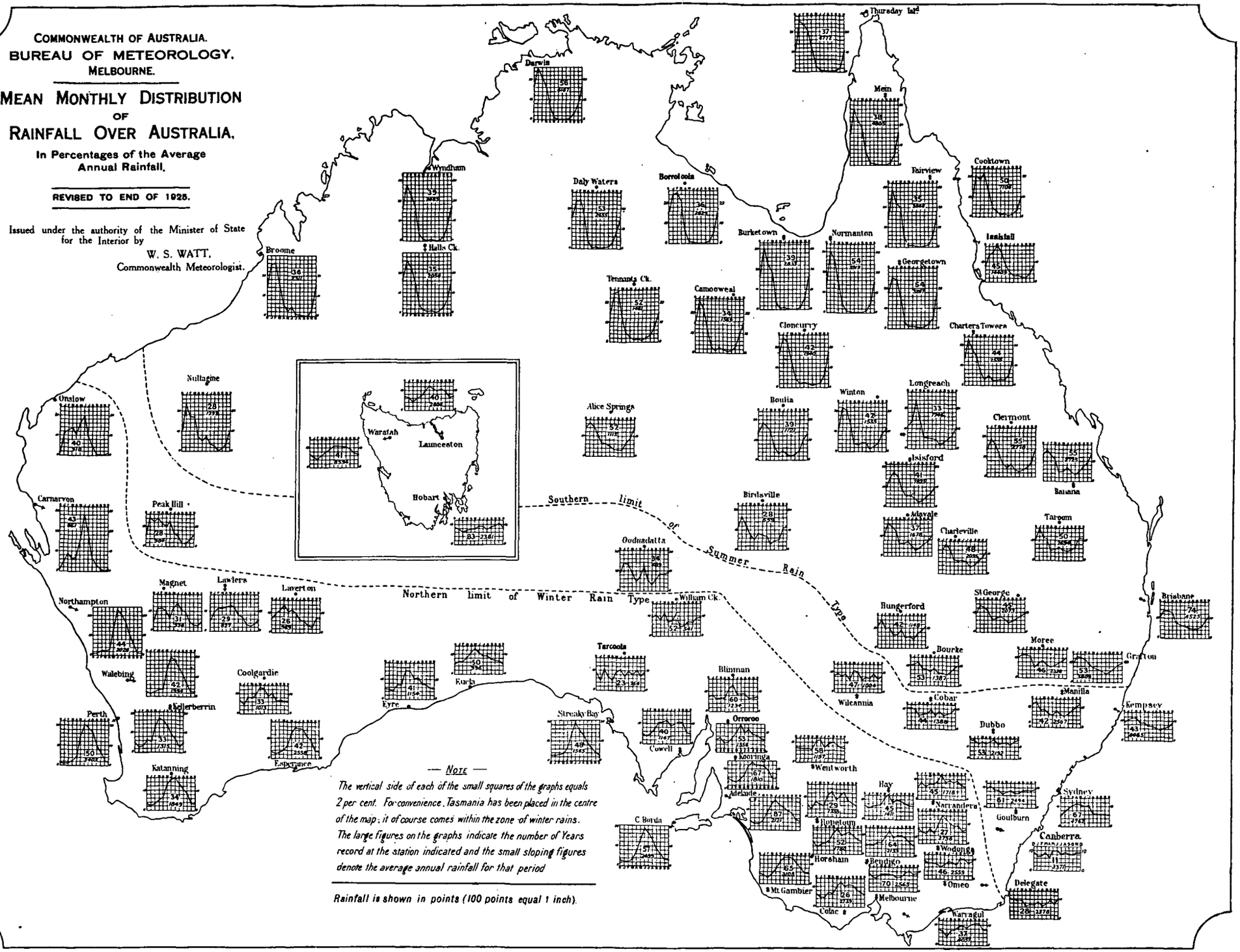
COMMONWEALTH OF AUSTRALIA.
BUREAU OF METEOROLOGY.
MELBOURNE.

MEAN MONTHLY DISTRIBUTION OF RAINFALL OVER AUSTRALIA.

In Percentages of the Average Annual Rainfall.

REVISED TO END OF 1925.

Issued under the authority of the Minister of State for the Interior by
W. S. WATT,
Commonwealth Meteorologist.



— *Note* —

The vertical side of each of the small squares of the graphs equals 2 per cent. For convenience, Tasmania has been placed in the centre of the map; it of course comes within the zone of winter rains. The large figures on the graphs indicate the number of Years record at the station indicated and the small sloping figures denote the average annual rainfall for that period

Rainfall is shown in points (100 points equal 1 inch).

11. **Hail.**—Hail falls most frequently along the southern shores of the continent in the winter, and over eastern Australia during the summer months. The size of the hailstones generally increases with distance from the coast. A summer rarely passes without some station experiencing a fall of stones exceeding in size an ordinary hen-egg, and many riddled sheets of light-gauge galvanized iron bear evidence of the weight and penetrating power of the stones.

The hailstones occur most frequently when the barometric readings indicate a flat and unstable condition of pressure. They are almost invariably associated with tornadoes or tornadic tendencies, and on the east coast the clouds from which the stones fall are generally of a remarkable sepia-coloured tint.

12. **Barometric Pressures.**—The mean annual barometric pressure (corrected to sea-level and standard gravity) in Australia varies from 29.80 inches on the north coast to 29.92 inches over the central and 30.03 inches in the southern parts of the continent. In January, the mean pressure ranges from 29.70 inches in the northern and central areas to 29.95 inches in the southern. The July mean pressure ranges from 29.90 inches at Darwin to 30.11 inches at Alice Springs. Barometer readings corrected to mean sea-level and standard gravity have, under anticyclonic conditions in the interior of the continent, ranged as high as 30.78 inches (at Kalgoorlie on the 28th July, 1901) and have fallen as low as 27.55 inches. This lowest record was registered at Mackay during a tropical hurricane on the 21st January, 1918. An almost equally abnormal reading of 27.88 inches was recorded at Innisfail during a similar storm on the 10th March, 1918. The mean barometric pressure for the capitals of Australia is shown on the graphs herein.

13. **Wind.**—(i) *Trade Winds.* The two distinctive wind currents in Australia are as previously stated, the south-east and westerly trade winds. As the belt of the earth's atmosphere in which they blow apparently follows the sun's ecliptic path north and south of the equator, so the area of the continent affected by these winds varies at different seasons of the year. During the summer months the anticyclonic belt travels in very high latitudes, thereby bringing the south-east trade winds as far south as 30° south latitude. The westerly trade winds retreat a considerable distance to the south of Australia, and are rarely in evidence in the hot months. When the sun passes to the north of the equator, the south-east trade winds follow it, and only operate to the north of the tropics for the greater part of the winter. The westerly winds come into lower latitudes during the same period of the year. They sweep across the southern areas of the continent from the Leeuwin to Cape Howe, and during some seasons are remarkably persistent and strong, and occasionally penetrate to almost tropical latitudes.

(ii) *Land and Sea Breezes.* The prevailing winds second in order of importance are the land and sea breezes. On the east coast the sea breezes which come in from the north-east, when in full force, frequently reach the velocity of a gale during the afternoon in the summer months, the maximum hourly velocity, ordinarily attained about 3 p.m., not infrequently attaining a rate of 35 to 40 miles per hour. This wind, although strong, is usually shallow in depth, and does not ordinarily penetrate more than 9 or 12 miles inland.

The land breezes on the east coast blow out from a westerly direction during the night.

On the western shores of the continent the directions are reversed. The sea breezes come in from the south-west, and the land breezes blow out from the north-east.

(iii) *Inland Winds.* Inland, the direction of the prevailing winds is largely regulated by the seasonal changes of pressure, so disposed as to cause the winds to radiate spirally outward from the centre of the continent during the winter months, and to circulate spirally from the seaboard to the centre of Australia during the summer months.

(iv) *Prevailing Direction at the Capital Cities.* In Canberra, the winds are mainly from easterly and north-westerly directions, the former predominating to a somewhat greater degree in the mornings, the latter in the afternoons and in the colder half of the year.

In Perth, southerly (south-west to south-east) is the prevailing direction for August to April inclusive and north-north-west to north-north-east for the midwinter months.

In Adelaide the summer winds are from the south-west and south, and in the winter from north-east to north.

In Brisbane, south-east winds are in evidence all the year round, but more especially from January to April.

In Sydney from May to September the prevailing direction is westerly, and for the remaining seven months north-easterly.

Melbourne winter winds are from north-west to north-east, and those of the summer from south-west to south-east.

At Hobart the prevailing direction for the year is from north-west.

Over the greater part of Australia, January is the most windy month, i.e., is the month when the winds are strongest on the average, though the most violent wind storms occur at other times during the year, the time varying with the latitude.

14. **Cyclones and Storms.**—The "elements" in Australia are ordinarily peaceful, and while destructive cyclones have visited various parts, more especially coastal areas, such visitations are rare, and may be properly described as erratic.

During the winter months, the southern shores of the continent are subject to cyclonic storms, evolved from the V-shaped depressions of the southern low-pressure belt. They are felt most severely over the south-western parts of Western Australia, to the south-east of South Australia, in Bass Strait, including the coast-line of Victoria, and on the west coast of Tasmania. Apparently the more violent wind pressures from these cyclones are experienced in their northern half, or in that part of them which has a north-westerly to a south-westerly circulation.

The north-east coast of Queensland is occasionally visited by hurricanes from the north-east tropics. During the first four months of the year, these hurricanes appear to have their origin in the neighbourhood of the South Pacific Islands, their path being a parabolic curve first to the S.W. and finally towards the S.E. Only a small percentage, however, reach Australia, the majority recurving in their path to the east of New Caledonia.

Very severe cyclones, locally known as "willy willies," are peculiar to the north-west coast of Western Australia from the months of November to April, inclusive. They apparently originate in the ocean in the vicinity of Cambridge Gulf, and travel in a south-westerly direction with continually increasing force, displaying their greatest energy near Cossack and Onslow, between latitudes 20° and 22° South. The winds in these storms, like those from the north-east tropics, are very violent and destructive, and cause great havoc amongst the pearl-fishers. The greatest velocities are usually to be found in the south-eastern quadrant of the cyclones, with north-east to east winds. After leaving the north-west coast, these storms either travel southwards, following the coast-line, or cross the continent to the Great Australian Bight. When they take the latter course, their track is marked by torrential rains, as much as 29.41 inches, for example, being recorded in 24 hours at Whim Creek from one such occurrence. Falls of 10 inches and over have frequently been recorded in the northern interior of Western Australia from similar storms.

Some further notes on severe cyclones and on "southerly bursters," a characteristic feature of the eastern part of Australia, will be found in previous issues of the Official Year Book (*see* No. 6, pp. 84, 85, 86).

A special article dealing with "Australian Hurricanes and Related Storms" appeared in Official Year Book No. 16, pp. 80–84.

15. **Influences affecting Australian Climate.**—(i) *General.* Australian history does not cover a sufficient period, nor is the country sufficiently occupied, to ascertain whether or not the advance of settlement has materially affected the climate as a whole. Local changes have, however, taken place, a fact which suggests that settlement and the treatment of the land have a distinct effect on local conditions. For example, the mean temperature of Sydney shows a rise of two tenths of a degree during the last twenty years, a change probably brought about by the great increase of residential and manufacturing buildings within the city and in the surrounding suburbs. Again, low-lying lands on the north coast of New South Wales, which originally were seldom subject to frosts, have, with the denudation of the surrounding hills from forests, experienced annual visitations, the probable explanation being that through the absence of trees the cold air of the high lands now flows unchecked and untempered down the sides of the hills to the valleys and lower lands.

(ii) *Influence of Forests on Climate.* As already indicated, forests doubtless exercise a great influence on local climate, and hence, to the extent that forestal undertakings will allow, the weather can be controlled by human agency. The direct action of forests is an equalizing one; thus, especially in equatorial regions, and during the warmest portion of the year, they considerably reduce the mean temperature of the air. They also reduce the diurnal extremes of shade temperatures by altering the extent of radiating surface by evaporation, and by checking the movement of air, and while decreasing evaporation from the ground, they increase the relative humidity. Vegetation greatly diminishes the rate of flow-off of rain and the washing away of surface soil, and when a region is protected by trees, a steadier water supply is ensured, and the rainfall is better conserved. In regions of snowfall, the supply of water to rivers is similarly regulated, and without this and the sheltering influence of ravines and "gullies," watercourses supplied mainly by melting snow would be subject to alternative periods of flooding and dryness. This is borne out in the case of the inland rivers, the River Murray, for example, which has never been known to become dry, deriving its steadiness of flow mainly through the causes indicated.

(iii) *Direct Influence of Forests on Rainfall.* Whether forests have a direct influence on rainfall is a debatable question, some authorities alleging that precipitation is undoubtedly induced by forests, while others take the opposite view.

Sufficient evidence exists, however, to prove that, even if the rainfall has not increased, the beneficial climatic effect of forest lands more than warrants their protection and extension. Rapid rate of evaporation, induced by both hot and cold winds, injures crops and makes life uncomfortable on the plains, and, while it may be doubted that the forest aids in increasing precipitation, it must be admitted that it does check winds and the rapid evaporation due to them. Trees as wind-breaks have been successfully planted in central parts of the United States, and there is no reason why similar experiments should not be successful in many parts of the treeless interior of Australia. The belts should be planted at right angles to the direction of the prevailing parching winds, and if not more than half a mile apart will afford shelter to the enclosed areas.

In previous issues some notes on observations made in other countries were added (*see* Official Year Book No. 6, pp. 86 and 95).

16. **Rainfall and Temperatures, Various Cities.**—The following table shows rainfall and temperature for various important cities throughout the world, for the Federal Capital, and for the capitals of the Australian States.

RAINFALL AND TEMPERATURES—VARIOUS CITIES.

Place.	Height above M.S.L.	Annual Rainfall.			Temperature.					
		Average.	Highest.	Lowest.	(a) Mean Summer.	(b) Mean Winter.	Highest on Record.	Lowest on Record.	Average Hottest Month.	Average Coldest Month.
	Ft.	Ins.	Ins.	Ins.	Fahr.	Fahr.	Fahr.	Fahr.	Fahr.	Fahr.
Amsterdam (Gardens) ..	3	31.26	38.39	20.24	61.3	37.4	93.2	3.2	64.0	37.0
Auckland ..	100	44.85	74.15	26.32	65.8	52.3	85.0	35.0	66.6	51.6
Athens ..	351	15.48	33.33	4.56	79.2	49.1	109.4	19.6	81.0	47.4
Bergen ..	116	73.43	107.32	54.33	56.1	34.7	86.0	7.3	57.4	34.2
Berlin (Central) ..	161	22.72	30.04	14.25	64.8	33.0	98.6	−13.4	66.0	31.8
Berne	1,877	36.30	58.23	24.69	62.2	30.1	91.4	− 3.6	64.4	28.0
Bombay ..	32	70.54	114.89	33.42	82.7	74.7	100.2	53.2	84.3	73.9
Breslau ..	410	22.60	32.51	15.91	64.2	30.9	99.9	−25.6	64.2	30.9
Brussels ..	328	28.35	41.18	17.73	62.6	36.0	95.4	− 4.4	63.7	34.5
Budapest ..	425	24.06	37.05	16.81	69.3	32.2	101.7	−10.1	71.2	30.2
Buenos Ayres ..	82	38.78	79.72	20.04	72.7	50.9	104.0	22.3	73.8	50.0
Calcutta ..	21	61.82	98.48	38.43	85.6	68.0	111.3	44.2	86.0	66.4
Capetown ..	40	25.50	36.72	17.71	68.1	54.7	102.0	34.0	68.8	53.9
Caracas ..	3,420	30.03	47.36	23.70	68.3	65.3	87.8	48.2	69.2	63.7
Chicago ..	823	33.28	45.86	24.52	70.0	26.1	103.0	−23.0	72.4	23.7
Christchurch ..	22	25.21	35.30	13.54	60.8	43.5	95.7	21.3	61.6	42.7
Christiania (Oslo)	82	25.39	36.18	16.24	61.0	25.5	95.0	−13.4	63.1	24.4
Colombo ..	24	88.53	123.96	53.56	81.6	78.7	97.2	61.6	82.0	78.6
Constantinople ..	245	28.75	42.74	14.78	74.0	43.5	103.6	13.0	75.7	42.0
Copenhagen ..	43	22.80	32.52	14.02	60.9	32.7	91.4	−13.0	62.6	31.8
Dresden ..	115	24.22	34.42	11.73	64.6	33.2	93.4	−15.3	66.0	31.6
Dublin (City) ..	54	27.66	35.56	16.60	59.1	42.8	87.0	13.0	60.4	42.5
Dunedin ..	300	36.92	54.51	21.86	57.3	43.5	94.0	23.0	58.0	42.5
Durban ..	260	40.79	71.27	27.24	75.6	64.4	110.6	41.1	76.7	63.8
Edinburgh (Leith)	441	25.21	32.05	16.44	55.9	39.0	90.0	6.0	57.3	38.7
Geneva ..	1,332	32.13	47.60	18.73	64.0	33.4	100.0	−13.5	65.8	31.8
Genoa	157	51.29	108.22	28.21	73.8	46.8	94.5	16.7	75.4	45.5
Glasgow ..	139	38.49	56.18	29.05	57.0	39.5	84.9	6.6	58.3	39.3
Greenwich ..	149	23.50	35.54	16.38	61.7	40.4	100.0	4.0	63.3	40.1
Hong Kong ..	109	85.61	119.72	45.84	81.5	60.5	97.0	32.0	82.0	58.8
Johannesburg ..	5,750	31.63	50.00	21.66	65.4	54.4	93.6	20.8	68.2	48.0
Leipzig ..	394	24.69	31.37	17.10	63.9	31.6	96.4	−16.6	64.8	30.0
Leningrad ..	16	21.30	29.52	13.75	61.1	17.4	89.6	−30.3	63.7	15.2
Lisbon ..	313	26.97	52.82	16.34	70.0	52.9	102.9	29.3	71.1	51.8
London (Kew) ..	18	23.80	38.18	12.16	60.8	39.9	94.0	9.0	62.3	39.1
Madras ..	22	49.85	78.92	21.74	89.0	76.8	113.0	57.5	89.9	76.1
Madrid ..	2,149	16.23	27.48	9.13	73.0	41.2	107.1	10.5	75.7	39.7
Marseilles ..	246	22.10	43.04	11.11	70.4	45.5	101.5	6.3	72.0	44.3
Moscow ..	526	18.94	29.07	12.07	63.4	14.7	95.0	−41.4	66.1	11.9
Naples ..	489	34.00	56.58	21.75	73.6	48.0	99.1	23.9	75.4	46.3
New York ..	314	44.63	58.68	33.17	71.4	31.8	102.0	−13.0	73.5	30.2
Ottawa ..	236	33.51	51.25	25.63	66.6	14.0	98.0	−33.0	69.1	11.8
Paris (Parc-St. Maur) ..	164	22.68	29.80	10.94	63.5	37.9	101.1	−19.5	64.8	36.7
Pekin	123	22.66	36.00	18.00	77.9	26.8	100.2	2.7	79.3	23.7
Quebec ..	296	41.25	53.79	32.12	63.4	12.6	97.0	−34.0	65.6	9.8
Rome	166	32.57	57.89	12.72	74.3	46.0	103.0	21.4	76.1	44.6
San Francisco ..	155	22.27	38.82	9.00	58.8	50.5	101.0	29.0	59.3	49.5
Shanghai ..	21	45.00	62.52	27.92	78.0	41.1	102.9	10.2	80.4	37.8
Singapore ..	8	91.99	158.68	32.71	81.2	78.6	94.2	63.4	81.5	78.3
Stockholm ..	146	21.60	28.47	11.77	62.2	26.4	91.8	−22.0	59.7	27.3
Tokio	65	61.45	86.37	45.72	74.8	39.2	91.0	29.7	77.7	37.5
Trieste	85	42.94	63.14	26.57	73.9	41.3	99.5	14.0	76.3	39.9
Vienna	664	25.51	35.55	16.54	65.3	31.3	97.2	−14.4	66.7	29.5
Vladivostock (Mt.)	420	29.23	38.48	21.17	65.5	9.7	92.3	−22.2	69.4	3.6
Washington ..	112	43.50	61.33	30.85	74.7	34.5	106.0	−15.0	76.8	32.9
Wellington ..	10	39.86	67.68	27.83	61.9	48.7	88.0	28.6	62.6	48.0
Zürich ..	1,542	45.15	78.27	29.02	63.3	31.3	94.1	− 0.8	65.1	29.5
FEDERAL CAPITAL.										
Canberra ..	1,920	23.32	35.89	16.31	(a) 67.9	(b) 43.8	104.2	14.0	68.8	42.7
STATE CAPITALS.										
Perth	197	34.81	49.22	20.21	(a) 73.2	(b) 56.1	112.2	34.2	74.2	55.3
Adelaide ..	140	21.15	30.87	11.39	72.9	53.2	116.3	32.0	74.0	51.9
Brisbane ..	137	45.04	88.26	16.17	76.7	59.8	108.9	36.1	77.2	58.6
Sydney ..	138	47.10	82.76	23.01	71.0	54.3	108.5	35.7	71.6	53.0
Melbourne ..	115	25.70	38.04	15.61	66.6	50.1	111.2	27.0	67.6	48.8
Hobart ..	177	24.01	43.39	13.43	61.4	46.9	105.2	27.0	62.2	45.8

(a) Mean of the three hottest months. (b) Mean of the three coldest months.

17. **Climatological Tables.**—The means, averages, extremes, totals, etc., for a number of climatological elements have been determined from long series of observations at the Australian capitals up to and including the year 1936. These are given in the following tables :—

CLIMATOLOGICAL DATA—CANBERRA, FEDERAL CAPITAL TERRITORY.

LAT. 35° 20′ S., LONG. 149° 15′ E. HEIGHT ABOVE M.S.L. 1,920 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day.	Wind. Mean Hourly Pressure. (lb.)	Wind. Total Miles.	Wind. Prevailing Direction. 9 a.m.	Wind. Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends.	19	8	8	8	20	20	15	9	18	11
January	29.833	358 23/33	0.11	4,426	S E & E	W	7.44	4	4.2	9
February	29.903	366 24/33	0.08	3,420	E	W	5.73	5	4.5	8
March	30.000	351 22/31	0.06	3,297	E	E	4.46	5	4.3	8
April	30.061	326 29/29	0.06	3,223	S E & E	N W	2.65	2	4.2	7
May	30.140	302 3/30	0.04	2,693	E	N	1.73	1	4.5	9
June	30.116	386 2/30	0.05	3,058	N	N & W	1.02	1	4.8	6
July	30.102	562 7/31	0.06	3,202	S	W	1.16	1	4.7	7
August	30.071	325 12/31	0.07	3,705	N	N & W	1.99	2	4.6	7
September	30.034	418 28/34	0.09	4,038	E	N	2.79	2	4.0	10
October	29.945	253 30/30	0.08	3,894	E	W	4.11	2	4.4	7
November	29.899	402 11/30	0.09	3,877	E	W	5.60	4	4.5	8
December	29.845	380 6/29	0.10	4,205	E	W	6.65	7	4.5	6
Year Totals	—	—	—	—	—	—	45.03	36	—	92
Year Averages	29.996	—	0.07	3,586	E	W	—	—	4.4	—
Year Extremes	—	562 7/7/31	—	—	—	—	—	—	—	—

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observation extends.	20	20	20	20	20	20	(a)	18	13
January	82.3	55.1	68.7	104.2 28/32	38.8 25/28	65.4	—	33.2 17/33	236.4
February	81.0	55.0	68.5	102.6 16/19	33.0 21/33	69.6	—	26.8 21/33	196.4
March	76.0	51.0	63.5	97.0 18/27	31.0 24/35	66.0	—	25.5 24/17	215.9
April	66.8	43.8	55.3	83.0 1/25	26.5 29/17	56.5	—	17.5 29/17	190.7
May	59.4	37.2	48.3	74.7 9/19	19.0 30/24	55.7	—	12.0 28/20	157.7
June	53.2	34.3	43.7	66.2 5/17	17.8 20/35	48.4	—	9.9 20/35	126.4
July	52.1	33.7	42.9	65.0 8/19	14.0 19/24	51.0	—	10.0 (d)	144.9
August	55.4	31.8	45.1	73.0 (b)	18.0 5/19	55.0	—	11.8 5/19	174.4
September	61.2	38.1	49.7	83.2 27/19	21.7 26/36	58.5	—	17.0 26/36	203.5
October	68.0	42.9	55.4	93.8 31/19	27.0 2/18	66.8	—	20.0 (e)	232.5
November	74.6	48.1	61.4	97.7 29/36	28.1 24/15	69.6	—	22.4 11/36	224.6
December	79.2	53.1	66.1	98.0 (c)	32.0 3/24	66.0	—	31.0 (f)	230.1
Year Averages	67.5	43.9	55.7	—	—	—	—	—	(g)2,332.6
Year Extremes	—	—	—	104.2 28/1/32	14.0 19/7/24	90.2	—	9.9 20/6/35	—

(a) Not available. (b) 28/1923 and 25/1924. (c) 12/1914 and 31/1931. (d) 19/1924 and 24/1935. (e) 1 and 3/1923. (f) 1/1923, 3/1924 and 15 and 16/1931. (g) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%). Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest In One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observation extends.	18	18	18	18	22	22	22	22	22	4
January	0.375	56	60	39	1.84	6	5.18 1936	0.07 1919, 1932	2.92 6/27	6
February	0.401	62	75	47	1.74	6	4.07 1936	0.00 1933	2.75 23/16	8
March	0.378	69	79	56	2.19	7	5.81 1914	0.21 1924	1.86 7/20	12
April	0.308	75	86	63	1.61	7	3.63 1935	0.20 1925	1.94 8/21	10
May	0.242	81	92	67	1.96	7	13.37 1925	0.06 1934	6.81 27/25	11
June	0.215	85	93	73	2.14	8	5.86 1931	0.44 1935	3.95 22/25	9
July	0 208	84	92	74	1.92	10	4.15 1933	0.25 1913	2.10 13/33	7
August	0.217	80	87	67	2.04	10	3.78 1934	0.01 1914	1.90 18/25	6
September	0.251	72	81	55	1.65	9	5.26 1915	0.36 1928	2.18 20/15	8
October	0.282	63	73	48	2.14	9	7.50 1934	0.62 1936	2.74 25/34	11
November	0.324	58	78	37	1.97	8	6.95 1924	0.09 1918	2.38 5/23	8
December	0.371	58	70	45	2.12	8	4.19 1910	0.11 1925	2.10 28/20	6
Year Totals	—	—	—	—	23.32	95	—	—	—	102
Year Averages	0.298	70	—	—	—	—	—	—	—	—
Year Extremes	—	—	93	37	—	—	13.37 5/10/25	0.00 2/1933	6.81 27/5/25	—

CLIMATOLOGICAL DATA—PERTH, WESTERN AUSTRALIA.

LAT. 31° 57′ S., LONG. 115° 50′ E. HEIGHT ABOVE M.S.L. 197 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day.		Mean Hourly Pressure. (lb.)	Total Miles.	Prevailing Direction. 9 a.m.	Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends.	52	39		39	39	39	38	38	39	29	36
January	29.906	797	27/98	0.64	10,955	E S E	S S W	10.42	1.9	2.9	14.2
February	29.924	650	6/08	0.59	9,510	E S E	S S W	8.66	1.5	3.1	12.0
March	29.984	651	6/13	0.51	9,755	E	S S W	7.62	1.5	3.5	12.2
April	30.073	955	25/00	0.37	8,079	E N E	S S W	4.73	1.4	4.3	8.4
May	30.070	825	29/32	0.31	7,982	N E	S W	2.75	2.2	5.5	5.6
June	30.062	914	17/27	0.36	7,914	N N E	W N W	1.77	2.2	5.9	3.8
July	30.088	1,015	20/26	0.39	8,519	N N E	W	1.74	2.1	5.7	5.0
August	30.086	966	15/03	0.41	8,781	N N E	W S W	2.35	1.5	5.5	5.5
September	30.062	864	11/05	0.44	8,800	N E	W S W	3.40	1.2	5.0	6.2
October	30.030	809	6/16	0.50	9,649	S S E	S W	5.33	1.0	4.8	6.6
November	29.993	777	18/97	0.57	9,925	S E	S W	7.69	1.3	3.9	8.5
December	29.926	776	6/22	0.62	10,725	S E	S S W	9.82	1.9	3.2	12.6
Year Totals	—	—		—	—	—	—	66.28	19.7	—	100.6
Year Averages	30.017	—		0.48	9,216	E	S W	—	—	4.4	—
Year Extremes	—	1,015	20/7/26	—	—	—	—	—	—	—	—

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.		Lowest.		Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.		Lowest on Grass.		Mean Hours of Sunshine.
No. of yrs. over which observation extends.	40	40	40	40		40		40	38		38		39
January	84.7	63.4	74.0	110.2	12/34	48.6	20/25	61.6	177.3	22/14	40.4	1/21	322.6
February	84.9	63.4	74.2	112.2	8/33	47.7	1/02	64.5	173.7	4/34	39.8	1/13	272.5
March	81.5	61.5	71.5	106.4	14/22	45.8	8/03	60.6	167.0	19/18	36.7	8/03	268.6
April	76.2	57.3	66.8	99.7	9/10	39.3	20/14	60.4	157.0	8/16	31.0	20/14	218.7
May	68.0	52.7	60.8	90.4	2/07	34.3	11/14	56.1	146.0	4/25	25.3	11/14	175.1
June	64.1	49.6	56.8	81.7	2/14	35.0	30/20	46.7	135.5	9/14	26.5	30/20	144.0
July	62.7	47.8	55.3	76.4	21/21	34.2	7/16	42.2	132.9	25/13	25.1	30/20	165.2
August	63.8	48.4	56.1	81.0	12/14	35.4	31/08	45.6	145.1	29/21	26.7	24/35	186.1
September	66.4	50.4	58.4	90.9	30/18	38.8	18/00	52.1	153.6	29/16	29.2	21/16	208.0
October	69.1	52.5	60.8	95.3	30/22	40.0	16/31	55.3	157.5	31/36	29.8	16/31	243.2
November	73.7	56.9	66.3	104.6	24/13	42.0	1/04	62.6	167.0	30/15	35.4	6/10	289.0
December	81.2	60.9	71.0	107.9	20/04	48.0	2/10	59.9	168.8	11/27	39.0	(a)	324.7
Year Averages	73.3	55.4	64.3	—		—		—	—		—		2817.7(b)
Year Extremes	—	—	—	112.2	8/2/33	34.2	7/7/16	78.0	177.3	22/1/14	25.1	30/7/20	—

(a) 2/1910 and 12/1920. (b) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%). Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.		Least Monthly.		Greatest In One Day.		Dew. Mean No. of Days Dew.
No. of yrs. over which observation extends.	40	40	40	40	61	61	61		61		61		39
January	0.435	52	61	41	0.34	3	2.17	1879	0.00	(a)	1.74	27/79	2.8
February	0.443	53	65	46	0.40	3	2.98	1915	0.00	(a)	1.63	26/15	3.9
March	0.426	57	66	46	0.83	4	5.71	1931	0.00	(a)	3.03	9/31	6.6
April	0.398	62	73	51	1.67	7	5.85	1926	0.00	1920	2.62	30/04	10.5
May	0.366	73	81	61	5.11	14	12.13	1879	0.98	1903	2.80	20/79	12.9
June	0.337	76	83	68	7.04	17	12.80	1923	2.16	1877	3.90	6/20	13.0
July	0.320	79	84	69	6.76	18	12.28	1926	2.42	1876	3.00	4/91	13.3
August	0.321	73	79	62	5.73	18	12.21	1928	0.46	1902	2.79	7/03	12.0
September	0.346	68	75	58	3.41	15	7.84	1923	0.34	1916	1.82	4/31	10.6
October	0.347	61	75	54	2.20	12	7.87	1890	0.49	1892	1.73	3/33	6.4
November	0.376	54	63	46	0.75	6	2.78	1916	0.00	1891	1.11	30/03	3.8
December	0.409	51	63	44	0.57	4	3.05	1888	0.00	1886, 1924	1.72	1/88	2.9
Year Totals	—	—	—	—	34.81	121	—		—		—		98.7
Year Averages	0.372	63	—	—	—	—	—		—		—		—
Year Extremes	—	—	84	41	—	—	12.80	6/1923	Nil	(b)	3.90	6/6/20	—

(a) Various years. (b) Jan., Feb., March, various years.

CLIMATOLOGICAL DATA—ADELAIDE, SOUTH AUSTRALIA.

LAT. 34° 56′ S., LONG. 138° 35′ E. HEIGHT ABOVE M.S.L. 140 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day.	Mean Hourly Pressure. (lb.)	Total Miles.	Prevailing Direction. 9 a.m.	Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends.	80	59	59	59	59	59	67	65	69	55
January	29.916	758 19/99	0.33	7,829	S W	S W	9.06	2.3	3.5	8.7
February	29.953	691 22/96	0.28	6,594	N E	S W	7.40	2.0	3.5	7.6
March	30.038	628 9/12	0.23	6,570	S	S W	5.95	2.1	4.0	7.2
April	30.119	773 10/96	0.21	6,079	N E	S W	3.51	1.6	5.0	4.5
May	30.125	760 9/80	0.20	6,212	N E	N W	2.07	1.7	5.8	2.4
June	30.103	750 12/78	0.24	6,447	N E	N	1.26	1.9	6.2	1.7
July	30.122	674 25/82	0.24	6,665	N E	N W	1.30	1.6	5.9	1.9
August	30.095	773 31/07	0.27	7,129	N E	S W	1.89	2.2	5.6	2.6
September	30.041	720 2/87	0.29	7,102	N N E	S W	2.88	2.3	5.2	3.5
October	29.996	768 28/98	0.32	7,783	N N E	S W	4.78	3.3	5.1	3.9
November	29.979	677 2/04	0.32	7,465	S W	S W	6.63	3.2	4.6	5.4
December	29.920	675 12/91	0.33	7,828	S W	S W	8.50	2.6	3.9	7.2
Year Totals	—	—	—	—	—	—	55.23	26.8	—	56.6
Year Averages	30.034	—	0.27	6,983	N E	S W	—	—	4.9	—
Year Extremes	—	773 (a)	—	—	—	—	—	—	—	—

(a) 10/4/96 and 31/8/97.

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observation extends.	80	80	80	80	80	80	56	76	55
January	86.0	61.5	73.7	116.3 26/58	45.1 21/84	71.2	180.0 18/82	36.5 14/79	308.6
February	86.0	61.9	74.0	113.6 12/99	45.5 23/18	68.1	170.5 10/00	35.8 23/26	263.7
March	80.9	58.9	69.9	110.5 9/34	43.9 21/33	66.6	174.0 17/83	32.1 21/33	239.5
April	73.2	54.5	63.9	98.0 10/66	39.6 15/59	58.4	155.0 1/83	30.2 16/17	181.0
May	65.8	50.3	58.0	89.5 4/21	36.9 (a)	52.6	148.2 12/79	25.6 19/28	150.2
June	60.4	46.7	53.6	76.0 23/65	32.5 27/76	43.5	138.8 18/79	22.9 12/13	123.1
July	59.0	44.7	51.9	74.0 11/06	32.0 24/08	42.0	134.5 26/90	22.1 30/29	136.6
August	62.0	45.9	54.0	85.0 31/11	32.3 17/59	52.7	140.0 31/92	22.8 11/29	163.8
September	66.4	48.0	57.2	90.7 23/82	32.7 4/58	58.0	160.5 23/82	25.0 25/27	185.5
October	72.4	51.4	61.9	102.9 21/22	36.0 —/57	66.9	162.0 30/21	27.8 (c)	225.9
November	78.6	55.1	67.0	113.5 21/65	40.8 2/09	72.7	166.9 20/78	31.5 2/09	263.2
December	83.2	58.9	71.1	114.6 29/31	43.0 (b)	71.6	175.7 7/99	32.5 4/84	300.2
Year Averages	72.8	53.2	63.0	—	—	—	—	—	2541.3 (d)
Year Extremes	—	—	—	116.3 26/1/58	32.0 24/7/08	84.3	180.0 18/1/82	22.1 30/7/29	

(a) 26/1895 and 24/1904. (b) 16/1861 and 4/1906. (c) 2/1918 and 4/1931. (d) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%). Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.		Least Monthly.		Greatest In One Day.		Dew. Mean No. of Days Dew.
No. of yrs. over which observation extends.	69	69	69	69	98	98	98		98		98		65
January	0.339	38	59	29	0.72	4	4.00	1850	Nil	(a)	2.30	2/80	3.6
February	0.355	41	56	30	0.72	4	6.09	1925	Nil	(a)	5.57	7/25	5.5
March	0.343	46	58	36	1.02	6	4.60	1878	Nil	(a)	3.50	5/78	10.4
April	0.335	56	72	37	1.72	9	6.78	1853	0.03	1923	3.15	5/60	13.9
May	0.315	67	76	49	2.72	14	7.75	1875	0.10	1934	2.75	1/53	16.0
June	0.297	76	84	67	3.08	15	8.58	1916	0.42	1886	2.11	1/20	16.1
July	0.277	76	87	66	2.64	17	5.38	1865	0.37	1899	1.75	10/65	17.4
August	0.283	69	77	54	2.54	16	6.24	1852	0.35	1914	2.23	19/51	16.7
September	0.296	60	72	44	2.08	14	5.83	1923	0.45	1896	1.59	20/23	15.7
October	0.298	51	67	29	1.74	11	3.83	1870	0.17	1914	2.24	16/08	12.8
November	0.307	42	57	31	1.14	8	4.10	1934	0.04	1885	2.08	7/34	6.7
December	0.321	39	50	31	1.03	6	3.98	1861	Nil	1904	2.12	23/13	4.4
Year Totals	—	—	—	—	21.15	124	—	—	—		—		139.2
Year Averages	0.309	53	—	—	—	—	—	—	—		—		—
Year Extremes	—	—	87	29	—	—	8.58	6/16	Nil	(b)	5.57	7/2/25	—

(a) Various years. (b) January, February, March, December, various years.

CLIMATOLOGICAL DATA—BRISBANE, QUEENSLAND.

LAT. 27° 28′ S., LONG. 153° 2′ E. HEIGHT ABOVE M.S.L. 137 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day.	Wind. Mean Hourly Pressure. (lb.)	Wind. Total Miles.	Wind. Prevailing Direction. 9 a.m.	Wind. Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends.	50	26	26	26	50	50	28	50	45	28
January	29.868	361 1/22	0.12	4,791	S E	E & N E	6.632	7.5	5.7	3.4
February	29.904	503 5/31	0.12	4,420	S & S E	N E & E	5.478	5.8	5.7	2.4
March	29.965	488 1/29	0.10	4,411	S	S E & E	5.054	4.6	5.3	5.0
April	30.042	400 3/25	0.09	3,980	S	S E & E	3.970	4.0	4.5	7.9
May	30.087	363 7/16	0.07	3,879	S	S E	3.060	3.2	4.3	8.8
June	30.073	455 14/28	0.08	3.880	S W & S	S & W	2.392	2.4	4.2	9.1
July	30.073	359 2/23	0.07	3,824	S & S W	S W	2.680	2.7	3.7	12.6
August	30.098	331 6/23	0.08	3,940	S & S W	S W & N E	3.457	3.8	3.4	12.9
September	30.044	329 4/31	0.08	3.879	S & S W	N E & E	4.348	5.9	3.5	12.4
October	30.004	355 14/36	0.10	4,385	S	N E	5.720	6.9	4.1	8.8
November	29.961	371 10/28	0.11	4,569	S E & N E	N E	6.347	8.7	4.7	6.1
December	29.888	467 15/26	0.12	4,831	S E	N E	7.019	9.5	5.3	3.7
Year Totals	—	—	—	—	—	—	56.157	65.0	—	93.1
Year Averages	30.000	—	—	4,232	S	N E	—	—	4.5	—
Year Extremes	—	503 5/2/31	0.10	—	—	—	—	—	—	—

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observation extends.	50	50	50	50	50	50	42	50	28
January	85.4	68.9	77.2	108.9 14/02	58.8 4/93	50.1	166.4 10/17	19.9 4/93	232.8
February	84.5	68.6	76.6	105.7 21/25	58.5 23/31	47.2	165.2 6/10	40.1 22/31	211.0
March	82.3	66.3	74.3	99.4 5/19	52.4 29/13	47.0	161.7 4/25	45.4 29/13	216.1
April	79.0	61.5	70.2	95.2 (a)	44.4 25/25	50.8	153.8 11/16	36.7 24/25	211.2
May	73.5	55.4	64.5	90.3 21/23	41.3 24/99	49.0	147.0 1/10	29.8 8/97	204.5
June	69.3	51.0	60.2	88.9 19/18	36.3 29/08	52.6	136.0 3/18	25.4 23/88	182.9
July	68.5	48.7	58.6	83.4 28/98	36.1 (b)	47.3	146.1 20/15	23.9 11/90	210.5
August	71.2	49.9	60.6	88.5 25/28	37.4 6/87	51.1	141.9 20/17	27.1 9/99	238.7
September	75.6	54.8	65.2	95.2 16/12	40.7 1/96	54.5	155.5 26/03	30.4 1/80	240.0
October	79.6	60.0	69.8	101.4 18/93	43.3 3/99	58.1	157.4 31/18	34.0 8/89	256.5
November	82.5	64.2	73.4	106.1 18/13	48.5 2/05	57.6	162.3 7/89	38.8 1/05	245.8
December	84.9	67.4	76.2	105.9 26/93	56.4 13/12	49.5	161.7 27/26	49.1 3/94	249.4
Year Averages	78.0	59.7	68.9	—	—	—	—	—	2600.4
Year Extremes	—	—	—	108.9 14/1/02	36.1 (c)	72.8	166.4 10/1/17	23.9 11/7/90	(d)

(a) 9/96 and 5/03. (b) 12/94 and 2/96. (c) 12/7/94 and 2/7/96. (d) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%). Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest In One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observation extends.	50	50	50	50	85	77	85	85	67	50
January	0.630	66	79	53	6.44	13	27.72 1895	0.32 1919	18.31 21/87	9.2
February	0.646	69	82	55	6.34	14	40.39 1893	0.58 1849	10.61 6/21	9.3
March	0.613	72	85	56	5.60	15	31.04 1879	Nil 1849	11.18 14/08	12.4
April	0.520	71	80	60	3.81	12	15.28 1867	0.05 1897	5.46 5/33	14.9
May	0.424	73	85	61	2.74	10	13.85 1876	Nil 1846	5.62 9/70	16.1
June	0.358	74	84	63	2.71	8	14.03 1873	Nil 1847	6.01 9/93	11.3
July	0.328	72	81	61	2.23	8	8.46 1889	Nil 1841	3.54 (a)	15.5
August	0.348	69	80	56	1.96	7	14.67 1879	Nil (a)	1.80 12/87	14.7
September	0.409	64	76	47	2.02	8	5.43 1886	0.10 1907	2.46 2/94	13.6
October	0.472	60	72	48	2.54	9	9.99 1882	0.14 1900	3.75 3/27	12.6
November	0.533	60	72	45	3.75	10	12.41 1917	Nil 1842	4.46 16/86	8.8
December	0.594	61	69	51	4.90	12	13.99 1910	0.35 1865	6.60 28/71	8.4
Year Totals	—	—	—	—	45.04	126	—	—	—	140.8
Year Averages	0.490	68	—	—	—	—	—	—	—	—
Year Extremes	—	—	85	45	—	—	40.39 2/93	Nil (b)	18.31 21/1/87	—

(a) 1862, 1869, 1880. (b) March, May, June, July, August and November, various years. (c) 15/76 and 16/89.

CLIMATOLOGICAL DATA—SYDNEY, NEW SOUTH WALES.

LAT. 33° 52′ S., LONG. 151° 12′ E. HEIGHT ABOVE M.S.L. 138 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from hourly readings.	Wind.* Greatest Number of Miles in One Day.	Wind.* Mean Hourly Pressure. (lb.)	Wind.* Total Miles.	Wind.* Prevailing Direction. 9 a.m.	Wind.* Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends.	78	70	70	70	70	70	57	77	75	26
January	29.894	627 3/93	0.27	6,982	N E	E N E	5.383	5.0	5.8	4.8
February	29.942	697 12/69	0.24	6,010	N E	E N E	4.243	4.4	6.0	5.3
March	30.013	754 20/70	0.18	5,819	W	E N E	3.657	4.2	5.5	5.8
April	30.068	642 6/82	0.16	5,330	W	E N E	2.637	3.7	5.0	7.5
May	30.085	682 6/98	0.17	5,443	W	N E	1.837	3.0	4.9	7.7
June	30.064	642 13/08	0.21	5,861	W	W	1.449	2.1	4.8	8.3
July	30.069	744 17/79	0.20	6,038	W	W	1.535	2.3	4.4	10.2
August	30.068	649 22/72	0.19	5,889	W	N E	1.966	3.2	4.0	11.1
September	30.010	771 6/74	0.22	6,128	W	N E	2.728	4.0	4.3	9.8
October	29.967	741 4/72	0.25	6,651	W	E N E	3.919	5.0	4.9	7.6
November	29.940	583 12/87	0.25	6,574	E N E	E N E	4.650	5.4	5.6	5.7
December	29.882	750 3/84	0.26	6,947	E N E	E N E	5.387	5.9	5.7	4.8
Year — Totals	—	—	—	—	—	—	39.391	48.2	—	88.6
Year — Averages	30.000	—	0.22	6,140	W	E N E	—	—	5.0	—
Year — Extremes	—	771 6/9/74	—	—	—	—	—	—	—	—

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observation extends.	78	78	78	78	78	78	74	78	16†
January	78.4	64.9	71.6	108.5 13/96	51.2 14/65	57.3	164.3 26/15	43.7 6/25	226.2
February	77.7	65.0	71.3	107.8 8/26	49.3 27/63	58.5	161.2 8/26	42.8 22/33	202.6
March	75.7	62.9	69.3	102.6 3/69	48.8 14/86	53.8	158.3 10/26	39.9 17/13	201.8
April	71.4	58.0	64.7	91.4 1/36	44.6 27/64	46.8	144.1 10/77	33.3 24/09	187.0
May	65.6	52.1	58.8	86.0 1/19	40.2 22/59	45.8	129.7 1/96	29.3 25/17	176.0
June	61.2	48.2	54.7	80.4 11/31	35.7 22/32	44.7	125.5 2/23	28.0 22/32	160.9
July	59.9	46.0	53.0	78.3 22/26	35.9 12/90	42.4	124.7 10/77	24.0 4/93	186.6
August	62.9	47.5	55.2	82.0 31/84	36.8 3/72	45.2	149.0 30/78	26.1 4/09	221.2
September	67.0	51.3	59.2	92.3 27/10	40.8 18/64	51.5	142.2 12/78	30.1 17/05	222.1
October	71.3	55.8	63.6	98.9 19/98	42.2 6/27	56.7	152.2 20/33	32.7 9/05	241.2
November	71.3	59.6	67.0	102.7 21/78	45.8 1/08	56.9	158.5 28/99	36.0 6/06	232.9
December	77.0	62.9	70.0	107.5 31/04	48.4 3/24	59.1	164.5 27/89	41.4 3/24	223.3
Year — Averages	70.2	56.2	63.2	—	—	—	—	—	2,481.8
Year — Extremes	—	—	—	108.5 13/1/96	35.7 22/6/32	72.8	164.5 27/12/89	24.0 4/7/03	(a)

(a) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (Inches). Mean 9 a.m.	Rel. Hum. (%). Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest In One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observation extends.	78	78	78	78	78	78	78	78	78	77
January	0.546	67	78	58	3.58	14	15.26 1911	0.25 1932	7.08 13/11	1.5
February	0.561	70	81	59	4.27	13	18.56 1873	0.23 1933	8.90 25/73	2.6
March	0.529	73	85	62	4.85	15	18.70 1870	0.42 1876	6.52 9/13	4.7
April	0.444	76	87	63	5.45	14	24.49 1861	0.06 1868	7.52 29/60	6.9
May	0.359	78	90	63	5.08	14	23.03 1919	0.18 1860	8.36 28/89	7.9
June	0.302	78	89	68	4.69	13	16.30 1885	0.10 1904	5.17 16/84	6.8
July	0.278	76	88	63	4.80	12	13.21 1900	0.12 1862	7.80 7/31	7.4
August	0.292	71	84	56	2.88	11	14.89 1899	0.04 1885	5.33 2/60	6.8
September	0.332	66	79	49	2.89	12	14.05 1879	0.08 1882	5.60 10/79	4.8
October	0.384	62	77	46	2.84	12	11.14 1916	0.21 1867	6.37 13/02	3.4
November	0.444	63	79	42	2.80	12	9.88 1865	0.07 1915	4.23 19/00	2.3
December	0.505	65	77	52	2.97	13	15.82 1920	0.23 1913	4.75 13/10	1.7
Year — Totals	—	—	—	—	47.10	155	—	—	—	56.8
Year — Averages	0.403	70	—	—	—	—	—	—	—	—
Year — Extremes	—	—	90	42	—	—	24.49 4/1861	0.01 8/1885	8.90 25/2/73	—

* Early records revised during 1929. Values for period 1867—September 1885, reduced 20 per cent.; for period September 1885 to March 1913, reduced 10 per cent. † From 1921 only; previous records discarded owing to faulty exposure of instruments.

CLIMATOLOGICAL DATA—MELBOURNE, VICTORIA.

LAT. 37° 49′ S., LONG. 144° 58′ E. HEIGHT ABOVE M.S.L., 115 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Min. Sea Level and Standard Gravity from hourly readings.	Wind. Greatest Number of Miles in One Day.		Wind. Mean Hourly Pressure. (lb.)	Wind. Total Miles.	Wind. Prevailing Direction. 9 a.m.	Wind. Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (Inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m. 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends.	79	63		63	63	63	63	64	29	79	29
January	29.900	583	10/97	0.26	6,900	S W	S E	6.427	1.9	5.1	7.1
February	29.959	566	8/68	0.23	5,963	S W	S E	5.037	2.3	4.9	6.8
March	30.033	677	9/81	0.19	5,959	S W	S E	4.015	1.8	5.5	5.4
April	30.100	597	7/68	0.17	5,394	S W	N W	2.408	1.2	5.9	4.5
May	30.108	693	12/65	0.16	5,492	N W	N E	1.490	0.6	6.4	3.3
June	30.082	761	13/76	0.20	5,871	N W	N E	1.131	0.4	6.6	2.4
July	30.087	755	8/74	0.19	5,956	N W	N E	1.093	0.4	6.3	2.9
August	30.062	637	11/75	0.22	6,415	N W	N E	1.498	1.0	6.3	2.9
September	29.999	617	11/72	0.25	6,529	N W	S W	2.321	1.2	6.1	3.4
October	29.965	899	5/66	0.25	6,844	S W	N W	3.357	1.9	6.0	3.6
November	29.952	734	13/66	0.25	6,602	S W	S E	4.586	2.4	5.9	3.8
December	29.890	655	1/75	0.27	7,024	S W	S E	5.736	2.0	5.5	4.5
Year Totals	—	—		—	—	—	—	39.049	17.1	—	50.6
Year Averages	30.013	—		0.22	6,246	S W	N W	—	—	5.9	—
Year Extremes	—	899	5/10/66	—	—	—	—	—	—	—	—

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.		Lowest.		Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.		Lowest on Grass.		Mean Hours of Sunshine.
No. of yrs. over which observation extends.	81	81	81	81		81		81	76		77		55
January	78.0	56.7	67.4	111.2	14/62	42.0	28/85	69.2	178.5	14/62	30.2	28/85	258.4
February	78.0	57.2	67.6	109.5	7/01	40.2	24/24	69.3	167.5	15/70	30.9	6/91	236.8
March	74.5	51.7	64.6	105.5	7/03	37.1	17/84	68.4	161.5	1/68	28.9	(b)	266.0
April	68.1	50.7	59.4	94.0	(a)	34.8	21/88	59.2	152.0	8/61	25.0	23/97	159.9
May	61.6	46.7	54.1	83.7	7/05	29.9	29/16	53.8	142.6	2/59	21.1	26/16	138.4
June	56.8	43.0	50.4	72.2	1/07	28.0	11/66	44.2	129.0	11/61	19.9	30/29	110.0
July	55.7	41.9	48.8	69.3	22/26	27.0	21/69	42.3	125.8	27/80	20.5	12/03	130.2
August	58.7	43.4	51.0	77.0	20/85	28.3	11/63	48.7	137.4	29/69	21.3	14/02	152.3
September	62.7	45.6	54.1	88.6	28/28	31.1	16/68	57.5	142.1	20/67	22.8	8/18	171.5
October	67.1	48.3	57.7	98.4	24/14	32.1	3/71	66.3	154.3	28/68	24.8	22/18	199.4
November	71.4	51.3	61.3	105.7	27/94	36.5	2/96	69.2	159.6	29/65	24.6	2/96	230.8
December	75.3	54.4	64.9	110.7	15/76	40.0	4/70	70.7	170.3	20/69	33.2	1/01	215.8
Year Averages	67.3	49.6	58.4	—		—		—	—		—		(c)2,239.5
Year Extremes	—	—	—	111.2	14/1/62	27.0	21/7/69	84.2	178.5	14/1/62	19.9	30/6/29	—

(a) 6/1865 and 17/1922. (b) 17/1884 and 20/1897. (c) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (Inches). Mean 9 a.m.	Rel. Hum. (%.) Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.		Least Monthly.		Greatest In One Day.		Dew. Mean No. of Days Dew.
No. of yrs. over which observation extends.	29	29	29	29	81	81	81		81		78		29
January	0.385	58	65	50	1.90	8	5.68	1904	0.01	1932	2.97	9/97	2.6
February	0.417	62	69	48	1.75	7	6.24	1904	0.03	1870	3.37	18/19	4.1
March	0.380	64	73	57	2.21	10	7.50	1911	0.14	1934	3.55	5/19	7.6
April	0.348	72	82	66	2.31	11	6.71	1901	Nil	1923	2.28	22/01	9.2
May	0.310	79	86	71	2.11	13	4.31	1862	0.14	1934	1.85	7/91	10.3
June	0.278	83	89	76	2.06	14	4.51	1859	0.73	1877	1.74	21/04	8.6
July	0.265	82	86	76	1.89	14	7.02	1891	0.57	1902	2.71	12/91	8.6
August	0.271	76	82	70	1.89	15	4.04	1924	0.48	1903	1.94	26/24	7.8
September	0.290	69	76	60	2.31	14	7.93	1916	0.52	1907	2.62	12/80	6.8
October	0.306	62	67	53	2.66	13	7.61	1869	0.29	1914	3.00	17/69	5.7
November	0.333	60	69	52	2.26	11	6.71	1916	0.25	1895	2.57	16/76	2.2
December	0.370	59	69	51	2.35	10	7.18	1863	0.11	1904	3.20	1/34	1.8
Year Totals	—	—	—	—	25.70	140	—		—		—		75.3
Year Averages	0.324	69	—	—	—	—	—		—		—		—
Year Extremes	—	—	89	48	—	—	7.93	9/1916	Nil	4/1923	3.55	5/3/19	—

CLIMATOLOGICAL DATA—HOBART, TASMANIA.

LAT. 42° 53′ S., LONG. 147° 20′ E. HEIGHT ABOVE M.S.L., 177 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day.	Wind. Mean Hourly Pressure. (lb.)	Wind. Total Miles.	Wind. Prevailing Direction. 9 a.m.	Wind. Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends.	52	26	26	26	31	31	26	29	74	30
January	29.826	500 30/16	0.19	3,962	N W to N	S E	4.815	0.8	6.1	2.3
February	29.917	605 4/27	0.15	4,761	N & N N W	S E	3.671	1.1	6.0	2.4
March	29.947	443 19/27	0.13	4,983	N & N N W	S E	3.036	1.3	5.9	2.4
April	29.969	533 27/26	0.14	4,865	N W to N	N W & S E	1.979	0.7	6.2	1.6
May	29.997	484 20/30	0.12	4,712	N W to N	N W to N	1.372	0.4	6.1	2.4
June	29.996	569 27/20	0.12	4,179	N W & N N W	N to N W	0.905	0.5	6.1	2.2
July	29.932	499 19/35	0.13	4,838	N N W & N W	N W to N	0.928	0.4	5.8	2.2
August	29.916	617 19/26	0.14	5,110	N to N W	N W to N	1.284	0.4	6.0	2.0
September	29.852	516 26/15	0.18	5,626	N to N W	N W & S E	1.958	0.7	6.1	1.6
October	29.825	461 8/13	0.20	6,122	N to N W	S E & N W	3.034	0.6	6.4	1.1
November	29.813	508 18/15	0.19	5,782	N to N W	S E	3.818	0.7	6.4	1.5
December	29.818	562 1/31	0.17	5,666	N to N W	S E	4.376	0.8	6.3	1.3
Year Totals	—	—	—	—	—	—	31.176	8.4	—	23.0
Year Averages	29.898	—	0.16	5,212	N to N W	S E & N W	—	—	6.1	—
Year Extremes	—	612 19/8/26	—	—	—	—	—	—	—	—

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extremes Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observation extends.	66	66	66	90	90	90	47	69	16*
January	71.0	52.8	61.9	105.0 (a)	40.0 3/72	65.0	166.0 (b)	30.6 19/97	235.9
February	71.2	53.3	62.2	104.4 12/99	39.0 20/87	65.4	165.0 24/98	28.3 -/87	196.8
March	67.0	50.9	59.4	99.0 -/61	35.2 31/26	63.8	150.0 3/05	27.5 30/02	199.3
April	62.5	47.7	55.1	90.0 1/56	30.0 25/56	60.0	142.0 18/93	25.0 -/86	141.6
May	57.4	43.9	50.6	77.8 5/21	26.2 20/02	48.6	128.0 (c)	20.0 19/02	142.2
June	52.7	41.0	46.8	75.0 7/74	28.0 22/79	47.0	122.0 12/94	21.0 6/87	118.2
July	52.1	39.4	45.8	72.0 22/77	27.0 18/66	45.0	121.0 12/03	18.7 16/86	129.4
August	55.0	41.1	48.0	77.0 3/76	30.0 10/73	47.0	129.0 -/87	20.1 7/00	159.4
September	58.7	43.2	51.0	81.7 23/26	30.0 12/41	51.7	138.0 23/93	18.3 16/26	173.2
October	62.6	45.6	54.1	92.0 24/14	32.0 12/89	60.0	156.0 9/93	23.8 (d)	190.9
November	65.9	48.2	57.0	98.0 23/88	35.2 5/13	62.8	151.0 19/92	26.0 1/08	220.8
December	69.0	51.2	60.1	105.2 30/97	38.0 13/06	67.2	157.0 30/18	27.2 -/86	217.6
Year Averages	62.2	46.5	54.3	—	—	—	—	—	2125.3
Year Extremes	—	—	—	105.2 30/12/97	27.0 18/7/66	78.2	165.0 24/2/98	18.3 16/9/26	(e)

(a) 27/49 and 1/00. (b) 5/86 and 13/05. (c) -/89 and -/93. (d) 1/86 and -/99. (e) Total for year.
* Early records discarded owing to faulty instrument.

CLIMATOLOGICAL DATA—HOBART, TASMANIA—*continued.*

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%). Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches) Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest In One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observation extends.	50	50	50	50	94	93	94	94	70	27
January	0.330	58	72	46	1.82	10	5.91 1893	0.03 1841	2.96 30/16	0.5
February ..	0.355	63	77	52	1.50	9	0.15 1854	0.07 1847	4.50 27/54	1.3
March	0.320	66	77	58	1.73	10	7.60 1854	0.02 1813	3.27 11/32	5.0
April	0.290	72	84	58	2.00	12	8.50 1935	0.07 1904	5.02 20/09	9.1
May	0.265	78	89	65	1.83	13	6.37 1905	0.10 1813	3.22 14/58	13.3
June	0.240	80	91	68	2.21	14	8.15 1899	0.22 1852	4.11 13/89	8.8
July	0.230	80	94	72	2.11	15	6.02 1922	0.30 1850	2.51 18/22	8.9
August	0.230	75	92	64	1.84	14	10.16 1858	0.23 1851	4.35 12/58	8.4
September ..	0.254	67	85	58	2.07	15	7.14 1844	0.39 1847	2.75 18/44	5.1
October	0.270	63	73	51	2.33	15	6.67 1906	0.26 1850	2.58 4/06	2.9
November ..	0.295	60	72	50	2.45	14	8.91 1819	0.16 1868	3.07 7/49	1.2
December ..	0.318	58	67	45	2.09	12	9.00 1875	0.11 1842	2.82 21/29	0.8
Year { Totals ..	—	—	—	—	24.01	153	—	—	—	65.3
Year { Averages ..	0.282	67	—	—	—	—	—	—	—	—
Year { Extremes ..	—	—	94	45	—	—	10.16 8/1858	0.02 3/1813	5.02 20/4/09	—

(*a*) 4.18 on 28/54 also.

§ 3. Standard Times in Australia.

Prior to 1895 the official time adopted in the several colonies was for most purposes the mean solar time of the capital city of each.

In November, 1892, an intercolonial conference of surveyors was held in Melbourne to consider, among other things, the advantages of introducing the system of standard time. In this system it was proposed to make the initial meridian that of Greenwich, and to change local standard time by whole hours according to the longitude east or west of that of Greenwich. Thus for every difference of 15° in longitude a change of one hour would be required. The minutes and seconds would then be identical everywhere.

To give effect to this proposal it was suggested that Australia should be divided into three zones, the standard times for which should be respectively the mean solar times of the meridians of 120°, 135° and 150° East longitude, thus giving standard times 8, 9 and 10 hours respectively, ahead of Greenwich time. It was proposed that the 120° zone should comprise Western Australia, that the 135° zone should comprise South Australia and the Northern Territory, and that the 150° zone should comprise Queensland, New South Wales, Victoria and Tasmania.

The matter was also considered by several intercolonial postal conferences, and eventually in 1894 and 1895 legislation was enacted by each of the colonies in accord with the recommendations of the surveyors' conference of 1892.

In 1898 the South Australian legislature amended its earlier provision, and adopted the mean solar time of the meridian 142° 30′ East longitude as the standard time for that colony, thus reducing the difference between the standard time of Adelaide and that of the capitals of the eastern colonies from an hour to half-an-hour, and forfeiting the great advantage of the system, viz., that the minutes and seconds should be identical throughout the world.

Particulars concerning these enactments are as follows :—

STANDARD TIMES IN AUSTRALIA.

State.	Date when Act came into Operation.	Meridian Selected.	Time Ahead of Greenwich. Hours.
New South Wales ..	1st February, 1895 ..	150° E.	10
Victoria	1st February, 1895 ..	150° E.	10
Queensland	1st January, 1895 ..	150° E.	10
South Australia ..	1st February, 1895 ..	135° E.	9
South Australia ..	1st May, 1899	142° 30′ E.	9½
Western Australia ..	1st December, 1895 ..	120° E.	8
Tasmania	1st September, 1895 ..	150° E.	10

The standard time in the Federal Capital Territory is the same as in New South Wales.

Consequent upon the opening of the Trans-Australian Railway an arrangement has been made by which the change of time between South Australia and Western Australia (viz., 1½ hours) is divided into two changes of 45 minutes each. Going east from Kalgoorlie the first change is made at Rawlinna, 235.18 miles out, where the time is put forward by 45 minutes. The second change of the same amount is made at Tarcoola, 794.05 miles out. Thenceforward South Australian standard time is kept. The advantage of standard time has thus been still further sacrificed, as there is not now even a whole half-hour difference; the essential idea of standard zone time has to this extent, therefore, been adandoned. The State Observatories at Sydney, Melbourne, Adelaide and Perth derive time by astronomical observation. By arrangement with the Australian Broadcasting Commission observatory time-signals are broadcast in the several States at intervals during the day. In addition, the Amalgamated Wireless (Australasia) Ltd. re-broadcast the daily time-signals of certain overseas stations.